

INFORMATION REPORT INFORMATION REPORT

CENTRAL INTELLIGENCE AGENCY

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SUBJECT	Soviet English-Language Repair Manual for the RSB-5 Transmitter		
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THIS IS UNEVALUATED INFORMATION. SOURCE GRADINGS ARE DEFINITIVE. APPRAISAL OF CONTENT IS TENTATIVE.

1. A 79-page, English-language, Soviet manual entitled Repair Manual of the RSB-5 Transmitter
- In addition to the text, the manual contains pull-out wiring diagrams for the power-supply panel, transmitter, low-voltage circuit, and mixer. The document was published in Prague, in 1958.
2. The RSB-5 is an airborne, high-frequency, liaison transmitter.

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16

50X1

COPY No.:

Repair manual of RSB-5 transmitter

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REPAIR MANUAL OF THE

RSB - 5 TRANSMITTER.

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I. REPAIR PROCEDURE.

Working place.

Location of defects and repairs adjustment and checking of the RSB-5 transmitter are carried out on a special working place.

The working place consists of a desk fitted with a supply panel /see Fig.1/ as well as with checking and measuring apparatus. A view of the working place for repair of the transmitter is shown in Fig. 2.

Instruments.

The following instruments are required for repair of the transmitter.

1. Type 526 or 527 heterodyne frequency meter
2. ZG-2A, ZG-2 or ZG-1 audio signal generator
3. ICH-5 or ICH-1 frequency meter
4. UM-2 or UM-1 universal bridge
5. VKS-7 or VKS-7A vacuum tube voltmeter
6. VK-2 vacuum tube voltmeter
7. EO-5 or EO-2 oscilloscope
8. MMG-1 megohmmeter
9. IM-8 modulation meter
10. IV-4, IV-3 or IV-3M outputmeter
11. Tt-1 tester
12. Artificial antenna

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- 2 -

50X1

T o o l s a n d e q u i p m e n t .

In the course of transmitter repair use is made of the following tools and equipment:

1. Tool kit for the aircraft equipment specialist foreman and engineer.
2. Adapter for checking the operation of the 6SA7 vacuum tube /Suppl.5/
3. Tool for transmitter dial adjustment /Suppl.6/.
4. Equivalent load of the power unit /Suppl.7/

Figure 1: Supply panel wiring diagram.

1/Ammeter 0-40A, 2/milliammeter, 0-300 mA,
3/milliammeter 0-30 mA, 4/Milliammeter 0-60mA,
6/ Milliammeter 0-200 mA, 7/RSB-5 Transmitter
turning indicator, 8/Voltmeter, 0-30V, 9/Volt-
meter, 10/terminals for connecting the IV-3,
11/Cable from the RSB-5 transmitter power unit,
12/Receptacle for connecting the r.f. unit
of the RSB-5 transmitter, 13/Switch, 14/Ter-
minal board inside the supply panel, 15/Re-
ceptacle of the RSB-5 transmitter antenna
tuning unit.

The reference Nos. of the individual wires cor-
respond to those in the transmitter wiring dia-
gram. a/ ON, b/ OFF, c/OFF

II. PRELIMINARY OF DEFECTS OF TRANSMITTER LOCATION.

It should be noted in the course of locating defects , repairs, adjustments and inspections that there are 350 and 1000 V in the transmitter r.f. unit as well as in the power and antenna units when the transmitter is switched ON and that these voltages may be dangerous to life. R.f. vol-
tage present in the leads and terminals of the antenna unit may cause burns /with the transmitter in operation/. For sa-

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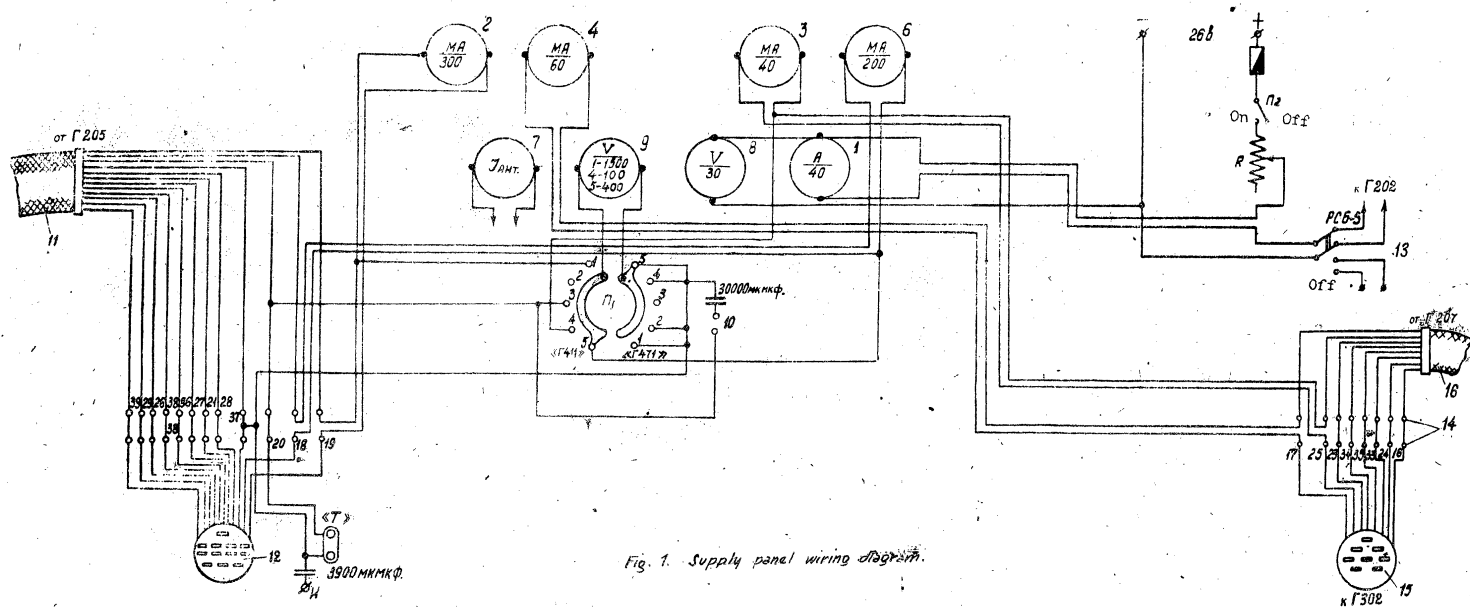


Fig. 1. Supply panel wiring diagram.

NO FOREIGN DISSEM

- 3

for safety reasons the transmitter should be switched OFF in the course of assembly, inspection, vacuum tube replacement and repair.

Preliminary location of defects is carried out in the following order:

1. Inspect externally all the transmitter units for good condition of the individual components and of the assembly.
2. Make sure that the power unit is in order.
3. Check the transmitter for troublefree operation.

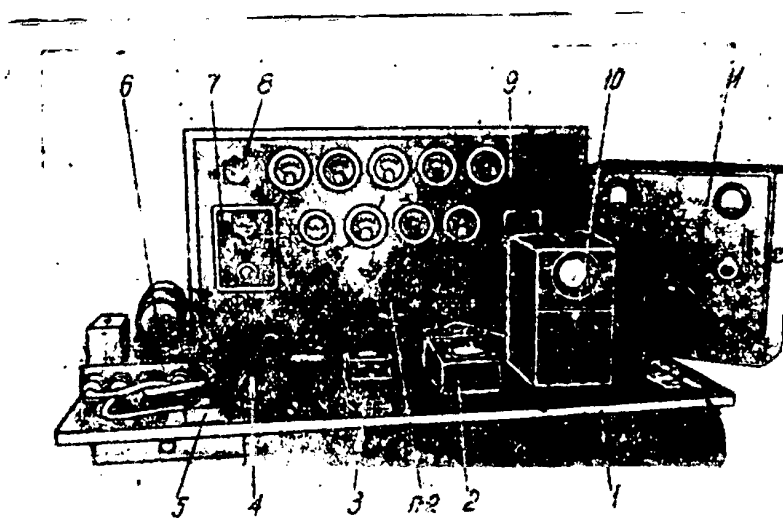


Figure 2: View of the working place for repair, adjustment and checking of the RSB-5 transmitter.

1/Desk, 2/Checked antenna tuning unit, 3/Tt-1 tester, 4/Equivalent load of the power unit, 5/RSB-5 transmitter control box, 6/Power unit, 7/IM-8 modulation depth meter, 8/Tuning indicator, 9/Supply panel, 10/Cathode ray oscilloscope, 11/Audio signal generator.

§ 1. Inspection.

Remove dust and dirt from the transmitter to be repaired by means of compressed air. Remove the bottom covers of the power and antenna units as well as the r.f. unit covers and inspect the transmitter assembly externally for good condition.

Check the following in the course of the inspection:

1. Absence of mechanical damage, traces of corrosion and damage of the lacquer coatings of the covers, chassis and other components.
2. Absence of dust, dirt and foreign matter such as pieces of solder, wire etc. inside the transmitter.
3. Absence of breaks in the flexible plate lead as well as stretched turns of the protective spirals.
4. Secure attachment of the individual elements to the chassis.
5. Absence of burned resistors in the transmitter as well as traces of electrolyte ooze from the electrolytic capacitor bodies.
6. Condition of assembly and absence of mechanical damage of resistors and capacitors.
7. Absence of traces inherent with burned or melted relay and switch contacts.
8. Absence of soldered connection damage.
9. Free motion of the mechanisms of the dials marked "FREQUENCY" and "ANTENNA ALIGNMENT"; these mechanisms should turn without jerking, seizing or rubbing against the front panel of the unit.
10. Correct functioning of the control element position setting devices.
11. Absence of bent pins and damaged connector threads as well as absence of leads not properly soldered to the connector pins.
12. Absence of pointer deformations as well as friction between the pointers and the dials or cover glasses of the indicators.

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13. Absence of mechanical damage /deformations and breaks of screening mesh and conduits/ of screened connecting cables.

§ 2. Location of defects of power unit.

Before starting to locate defects of the transmitter make sure that the power unit is in good condition. For this purpose it is necessary to check its high tension as well as tension circuits, audio signal generator and the rectifier. This is carried out with an equivalent load connected to the power unit /Suppl. 7/.

The checking procedure effected in the following order:

1. Set all the switches on the panel and on the equivalent load to their OFF positions.
2. Connect the power unit to the panel as well as to the equivalent load.
3. Switch ON the panel supply actuating switch P 2 located on the panel /Fig.2/
4. Switch ON the power unit. Set the equivalent load switch to OFF and check, by means of an ammeter located on the panel, the total current in the low tension circuits of the power unit. This current should not exceed 10A. Observing the ammeter pointer, note the moment at which the starting relay E 202 is energized. The pointer swings to approximately 2/3 of the dial at the instant of switching ON and settles at 10 A afterwards.

Step-starting relay E 201 should be energized within 1-2 seconds after the E 202 relay has been energized, shorting the R 202 resistor. "The reception-Transmission" /E 203/ should be energized simultaneously with the relay E 202.

If one of the relays is not energized, or if the current

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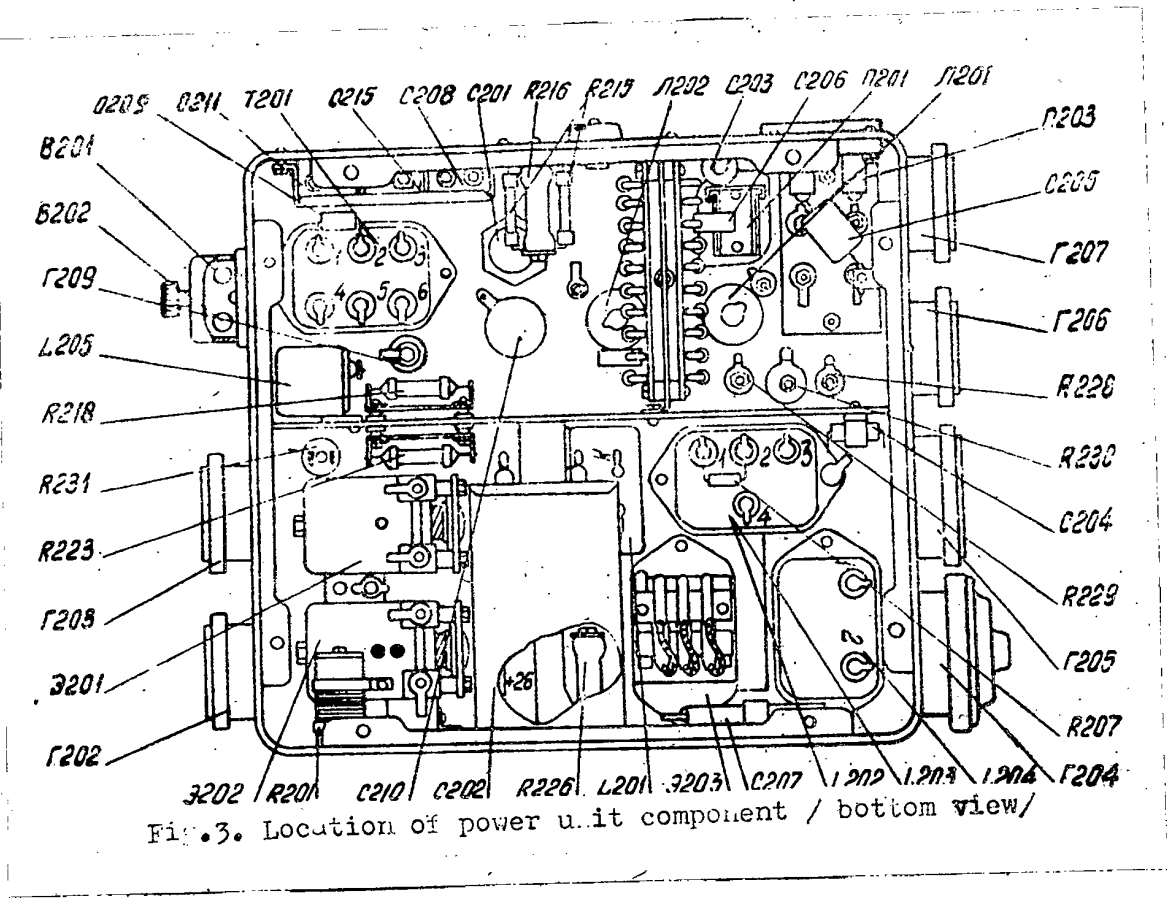


Fig. 3. Location of power unit component / bottom view/

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- 6 -

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exceeds 10A, check the following:

1. Resistance of the relay coils /Suppl. 4/.
2. Condition of the power unit low tension circuit assembly.
3. Resistors R 227, R 201, capacitor C 204 and the resistance of choke L 201, L 202 and L 203 coils. The location of the power unit components is shown in Fig. 3.
4. Check the supply current and voltage of the plate and screengrid circuits by means of the instruments installed on the panel. The current in the 350 V circuit should be equal to 75 MA and 180 mA in the 1000 V circuit.

If the current in the 350 V commutator circuit differs excessively from 75 mA, check the following:

1. Capacitors C 201, C 203 and C 215,
2. Resistors R 229, R 230, R 223, R 224 and R 225,
3. The condition of assembly in the 350 V commutator circuit of the power unit,
4. Capacitor C 202 and the 1000 V commutator circuit.

Replace the defective resistors and capacitors according to the specification in the transmitter wiring diagram /see Suppl2/

Rewind the choke and relay coils according to the data given in Suppl. 4, if necessary. Adjust the relay, following the procedure outlined in chapter IV.

After checking the low and high tension circuits, check the rectifier and audio signal generator for proper operation. This is done in the following order:

1. Connect a wire-wound resistor 8 ohms 5 W across Nos. 23 pins and 24 of connector G-207.

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SECRET
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- 7 -

50X1

2. Check the D.C. voltage across No. 21 pin of connector G 204 and power unit chassis. This voltage should be within 220 - 300 V. If the voltage differs from the value given check the following:

The socket voltages of the L 202 vacuum tube /Table 1./.

The location of the vacuum tube socket terminals is shown in fig. 4.

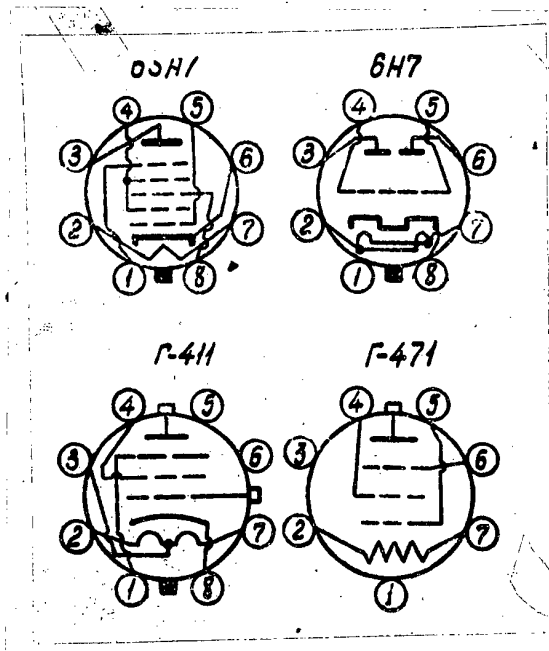


Figure 4: Location of socket terminal.

Table 1.

Socket voltages of the speech amplifier and audio signal generator vacuum tubes measured on the chassis.

Stage	Tube type	Socket voltage V								When checked with tester
		1	2	3	4	5	6	7	8	
Audio signal generator and rectifier L202	6N7	0	5,4	-152	-152	-8	300	11	0	Tt-1
		0	5,6	-165	-165	-8,8	320	11,6	0	VK-2 VTVM
Speech ampl. /L 201/	6N7	0	0	96	3,4	-8	300	5,8	0	Tt-1
		0	0	275	-4,2	-8	320	5,9	0	VK-2 VTVM

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2. Resistance of T 201 transformer windings /Table 2/,
3. Resistors R 215, R 216, R 217, R 218, R 214 and R 228,
4. Capacitors C 210 and C 209,
5. Condition of the assembly.

Replace defective resistors and capacitors. Rewind defective windings of the T 201 transformer according to the data given in Table 2.

Table 2.

T 201 Transformer Winding Data

Item No.	Technical parameters	Winding		
		1 - 2	3 - 4	6 - 5
1	Wire type	PEL-1	PEL-1	PEL-1
2	Wire diameter mm	0,15	0,1	0,1
3	Number of turns	1300	1300	1300
4	Resistance ohm	105-125	310-350	45-55
5	Test voltage between the winding and the body V	2000	2000	-
6	Inductance Henry	2-2,4	1,9-2,3	0,8-0,9
7	Insulation resistance between the winding and the body megohm	100	100	100

§ 3. Checking of overall performance of transmitter.

1. Connect the transmitter /r.f. unit, power unit and antenna tuning unit/ to the panel and to the artificial antenna.
2. Set the "Reception-Transmission" and "TONE-VOICE" switches located on the control panel to "Reception" and "Voice" respectively
3. Set the P 107 switch /Current check/ of the unit position "E III".
4. Loosen the lock nuts of the unit adjustment knob.

5. Set the P 103 switch to amplification /pull the knob out/.
6. Check the operation of the transmitter. The test marked frequencies as well as the positions of the controls "Antenna adjustment", "Coupling coarse", "Coupling fine" and of the "PR-PS" switch when tuning the transmitter to the individual frequencies are given in Table 3.

Table 3.

Control knob positions in the course of alignment
of the transmitter with the artificial antenna.

Item No.	Freq. kc	Coupling -coarse	Coupling -fine	Variometer	Switch PR-PS	N o t e
1	2150	4	96	85	PS	Amplification
2	2900	4	65	50	PS	
3	3600	4	15	35	PS	
4	4300	2	22	30	PS	Frequency doubling
5	5800	2	6	20	PS	
6	7200	1	20	10	PS	
7	3600	4	65	35	PS	Amplification
8	4800	4	15	25	PS	
9	6000	3	10	180	PS	
10	7200	2	10	14	PS	Frequency doubling
11	9600	1	5	8	PR	
12	12000	1	40	10	PR	

7. Connect the TL-3 telephone plug to the "T" socket on the panel.
8. Switch ON the unit depressing the toggle of P 102 switch to its extreme left position.
9. Adjust the output circuit so as to obtain maximum reading of the indicator I301, connected to the antenna tuning unit. Turn the variometer 5-8 turns to the left or right from its position given in the table.

S E C R E T
NO FOREIGN DISSEM - 10

50X1

10. Set the switch P 301 of the antenna tuning unit to position "10" when tuning to 2150 kc or to position "20" when tuning to 3600 kc.
11. Adjust the set frequency of the unit by turning the knob marked "Frequency" slightly to the left or right, so as to obtain zero beat in the headphones.
Connect an insulated wire 0,5 - 1 m long to the terminal "C" of the antenna tuning unit and place it round the r.f. unit if the beat frequency signal heard in the headphones is weak.
Shift the transmitter dial scale corresponding to the frequency of 2150 kc by means of actuating the knob marked "Frequency" to determine the zero beat; the dial scale should be shifted with respect to the gauge line of the sight by a maximum of one third of the distance between the adjacent dial graduations.
12. Set the unit P 102 cut in switch to its extreme right position. Adjust the set unit frequency by means of the zero beat in the headphones.
13. Set the antenna tuning unit switch P 301 to "OFF".
14. Note the reading of the instrument marked "Current" check" with the switch P 102 set to its extreme right position. /the instrument is located on the front panel of the unit/. The pointer of the instrument /I 101/ should be within the limits marked by means of a green sector on the instrument dial with the switch set to the position E III. Proceed as follows if the pointer is out of the green sector:
1st case. Operation with the series connected output circuit /PS-PR switch set to PS/:

S E C R E T
NO FOREIGN DISSEM

- 1/If the pointer does not reach the green sector /low driving voltage/ the coupling between the L 103 vacuum tube and the output stage should be increased as follows:
 - a/Turn the knob "Antenna adjustment" to the right but not more than one fifth of a turn /increase inductance/,
 - b/Adjust the transmitter actuating the knob "Coupling-fine" so as to obtain maximum reading of the indicator I 301.

Check the tuning indicator and its circuits if the indicator "Current check" shows a reading, the artificial antenna ammeter indicates antenna current and the tuning indicator indicates zero.

The procedure for checking the tuning indicator and its circuit is given in chapter III § 3.

- c/Repeat operations outlined in a/ and b/ as long as the pointer of the indicator "Current check" is not in the centre of the green sector of the dial in the course of tuning for maximum current.
- 2/ Turn the above mentioned controls in the reverse direction, otherwise following the procedure, outlined in a/, b/ and c/ if the pointer passes the green dial sector /high driving voltage/.
 - 3/ Turn the "Coupling-coarse" knob by one graduation to the right or left, provided that the knob "Coupling-fine" has reached one of its limit positions /maximum capacity 110° or 0° minimum capacity/. Turn the knobs "Coupling-coarse" and "Coupling-fine" with the transmitter switched OFF. Tuning of the output stage with the knob "Coupling-coarse" in its new position is accomplished by means of the knob "Coupling-fine" after setting the switch P 102 to position "N" /to the left/. Set the switch P 102 to its right position as soon as the stage adjustment is finished and adjust optimum stage operation following the procedure outlined in 1 a/, b/ and c/. The knob "Coupling-fine" should be adjusted each time to a position corresponding exactly to the maximum reading of the tuning indicator with the pointer of the "Current check" indicator pointing at the centre of the green dial sector.

- 12 -

2nd case: Operation with the parallel connected output circuit /PR-PS switch set to PR/:

50X1

- 1/ Adjust the pointer of the indicator to the centre of the green dial sector, turning the "antenna adjustment" knob to the left or turning the "Coupling-fine" knob to the right if the pointer is not in the required position. It should be noted in the course of the output stage adjustment that due to the wide limits within which the output stage capacity and inductance can be changed, it is possible to tune this stage to the harmonic of the set frequency. For this purpose be sure that the positions of the knobs "Coupling-coarse", "Coupling-fine" and "Antenna adjustment" correspond to those given in table 3.

15. Set the switches "PRD-PRM", "TLG-TLF" and "100% - 25%", located on the control box, to "PRD", "TLG" and "100%" respectively.
16. Depress the key and check the current by means of the instrument installed in the artificial antenna.
17. Calculate the power output of the transmitter dissipated in the artificial antenna, using the formula $P = I^2 R$ where I is the current following through the artificial antenna and R is the equivalent resistance of the artificial antenna at the given frequency /Table 4/.

T a b l e 4.

Parameters of the artificial antenna supplied by the manufacturer for the RSB-5 transmitter.							
Frequency	2150	4000	6000	8000	9000	11000	
kc	3000	5000	7000	8600	10000	12000	
Equivalent resistance ohms	6	5	4,3,4	3,5 4,4 3,7	5,0 4,7	6,7 6,2	9,0

Note : Artificial antennas for RSB-5 radio transmitters are made in the manufacturer's factory and are supplied in

the transmitter overhaul kit. It is forbidden to make 50X1
artificial antennas for the RSB-5 transmitters in repair
shops. The power output of the transmitter should not be
less than the value given in the technical requirements
/Supl.3/.

Radio transmitters the power output of which complies with
the values given in the technical requirements are sub-
jected to checks of the remaining parameters included in
the technical requirements /Supl.3/. The test procedures
involved in checking the transmitters for compliance with
the technical requirements are outlined in chapter V.
Radio transmitters the parameters of which are found to
be within the limits of the technical requirements are
approved for further service. Radio transmitters whose
parameters are found to be outside the limits given in the
technical requirements are subjected to stage by stage
location of defects and adjustment.

III. STAGE BY STAGE LOCATION OF DEFECTS OF TRANSMITTER

§ 1. Location of defects of R.f. unit.

The location of defects of each of the r.f. units should
be accomplished in the following order:

1. Connect the power unit to the panel, to the r.f. unit and
to the control box. Connect a wire-wound resistor 8 ohms
5 W across pins Nos. 23 and 34 of connector G 207, instal-
led on the power unit.
2. Connect the artificial antenna to both the terminal "B"
and to the r.f. unit chassis.
3. Set the "TLF-TLG" and "PRD-PRM" switches located on the
control panel to "TLG" and "PRM" respectively.
4. Set the switch P 107 marked "Current check" to "E III".
5. Set the band switch to amplification /pull the button of
the switch out/.
6. Tune the transmitter to 2150 kc actuating the knob marked

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- 14 -

50X1

"Frequency" when checking the first r.f. unit, and to 3600 kc when checking the second unit r.f.

7. Set the controls marked "Antenna adjustment", "Coupling-coarse", "Coupling-fine" as well as the "PS-PR", switch to the positions given in table 3.
8. Depress the P 102 key to the left, check the low tension circuit current and the function of the E 103, E 101, and E 102 relays.

The low tension circuit current should not exceed 15 A.

If the current differs from the given value or if one of the relays does not operate, check the following:

- 1/ The resistance of the relay coils and the condition of the relay contacts.
- 2/ Resistance R 108.
- 3/ Capacitors C 123 and C 122.
- 4/ Contacts of the P 102 switch.
9. Set the switch P 1 installed on the panel to G 411 and check the plate supply voltage of the L 101 and L 102 vacuum tubes. This voltage should be within 315 and 360 V.
Set the switch P 1 to "G 471" and check the plate voltage of the L 103 vacuum tube. This voltage should be within 900 and 1100 V.

If the voltages differ from the given values check the following:

- 1/ Capacitors C 109, C 107, C 114, C 117 and C 116 in the plate circuit of the L 101 and L 102 vacuum tubes. The location of the components on the chassis is shown in fig. 5.
- 2/ Capacitor C 121 in the L 103 vacuum tube plate circuit, resistors R 103, R 107 and coils L 102, L 105 and L 106.

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- 15 -

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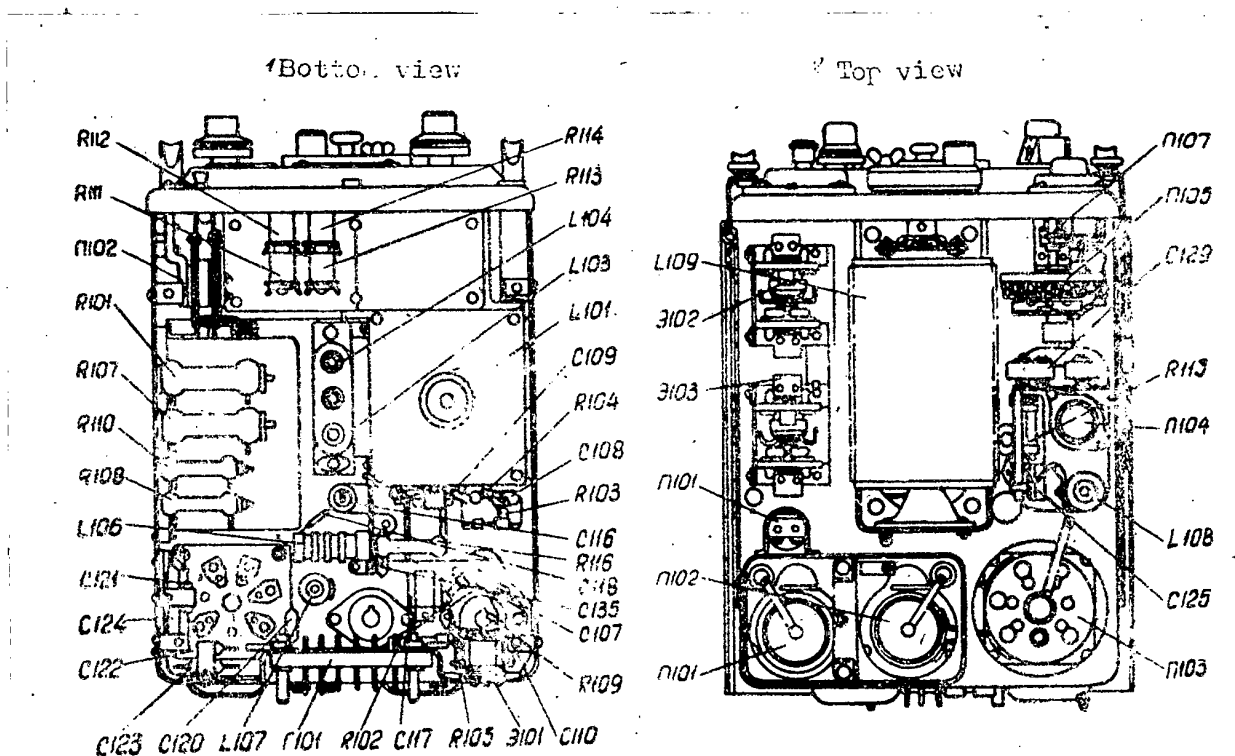


Figure 5: Location of the components in the r.f. units
/top and bottom view/
a/bottom view, b/top view

Replace the defective resistors and capacitors in accordance with both the specification and the wiring diagram of the transmitter. Rewind defective relay coils. Clean contacts which are burned or showing traces of oxidation.

10. Adjust supply voltage to 26 V.
11. Adjust the output circuit so as to obtain the maximum reading of the ammeter installed in the artificial antenna, turning the knob marked "Antenna adjustment" 5-8 turns to the right or left.
12. Depress the P.102 key to the right.
The pointer of the I 101 indicator should then be within the green sector marked on the dial.
13. Set the switches to "PRD-PRM", "TLF-TLG" and 100% - 25% "PRD", "TLG" and 100% respectively.

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50X1

14. Check the current and note the artificial antenna ammeter reading.
15. Calculate the power output of the transmitter dissipated in the artificial antenna, making use of the formula $P = I^2 R$ where I is the current following through the artificial antenna and R is the resistance of the artificial antenna at the frequency set in accordance with Table 4. The power output of the transmitter should not be less than the value given in the technical requirements /Suppl.3/. Check the transmitters the power output of which is less than the value given in the technical requirements as well as those the power output of which is zero, following the procedure outlined in 16. Check the control grid voltage of the L 103 vacuum tube, using a VKS-7 voltmeter. This control grid voltage should be within the limits given in Table 5.

Table 5.

A.C. voltages at the control grid of the output stage
at 100% power output.

Item No.	Unit No.	Mode of operation	Frequency kc	Control grid voltage of L 103 vacuum tube V
1	No.1 Unit	Amplification	2150	115 - 130
			3000	115 - 130
		Frequency doubling	4300	115 - 130
			6000	115 - 130
2	No.2 Unit	Amplification	4300	115 - 130
			6000	115 - 130
		Frequency doubling	8600	115 - 130

If there no voltage at the control grid of the L 103 vacuum tube, or if it is lower than the value corresponding to the

SECRET

NO FOREIGN DISSEM

NO FOREIGN DISSEM- 17

given frequency, check the master oscillator. If the voltage, ^{50X1} corresponds to the values given in Table 5 and the power output value is lower than that given in the technical requirements, check the output stage.

Table 6.

L 101 Vacuum tube socket voltages measured on the chassis with transmitter switched to RT transmission and operated at 100% power output.

Unit No.	Operation mode	Frequency kc	Vacuum tube socket voltages V						Instrument type required
			Suppressor grid voltage	Screen grid volt.	AC control grid volt. checked by the VKS-7	D.C. control grid voltage	L102 buffer stage A.C. control grid volt. checked by the VKS-7	Instrument D.C. plate voltage	
1	Amplification	2150	5,0	68	8,2	-6,8	21	200	Tt-1
			6,0	68		-12		220	VK-2
		3100	5,2	70	13,0	-10	36	195	Tt-1
			5,0	72		-19		240	VK-2
	Freq. doubling	4300	5,4	66	8,0	-10	18	200	Tt-1
			6,0	66		-12		210	VK-2
2	Amplification	3600	6,5	62	7,2	-10	20	160	Tt-1
			7,8	66		-11		220	VK-2
		6000	6,0	62	7,2	-9	18	120	Tt-1
			7,5	66		-11		230	VK-2
	Freq. doubling	7200	7,8	71	6,5	-10	21	125	Tt-1
			6,0	65		-12		240	VK-2
		12000	6,0	70	9,0	-6,5	24	120	Tt-1
			6,9	72		-13		260	VK-2

Location of defects of master oscillator.

Check the control grid voltages of both the L 101 master oscillator vacuum tube and the L 102 vacuum tube using a VKS-7 voltmeter. If the voltage value is lower than that given in Table 6 or if it is zero, check the following:

- 18 -

50X1

1. The socket voltages of the L 101 vacuum tube /Table 6/.
2. Resistors R 101, R 111, R 102, R 103, R 105, R 104 and R 109.

3. Capacitors C 109, C 107, C 106, C 108, C 105 and C 110.

Unsolder the lead connecting the E 101 relay to the chassis, unscrew the two relay attaching screws, remove the relay and if necessary replace capacitor C 107.

4. Contacts of the E 101 relay.
5. Capacitors C 104, C 103, C 102 and C 101.
6. Soldered connections on the L 101 and L 102 coils.

Replace defective resistors and capacitors and recheck the master oscillator for correct functioning.

If all the above mentioned components are in good conditions and the master oscillator fails to oscillate, replace resistor R 101 /25000 ohms/ by a resistor having 10000 ohms.

Check the r.f. voltage at the control grid of vacuum tube L 103 if the master oscillator oscillates and if the r.f. voltage at the control grid of the L 102 vacuum tube is within the limits given in Table 6. The control grid voltage of the L 103 vacuum tube should be within 115 - 130 V. Look for defects of the buffer stage if there is no r.f. voltage at the control grid of vacuum tube L 103, or if this voltage is lower than that specified.

Location of defects of buffer stage.

Check the control grid voltages of the L 102 and L 103 vacuum tubes operating as amplifiers first and frequency doublers second, using a VKS-7 voltmeter.

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SECRET
NO FOREIGN DISSEM

- 19 -

50X1

If these voltages are equal to zero or their respective values are lower than those given, check the following:

1. The socket voltages of the L 102 vacuum tube /Table 7/.
2. Resistors R 106, R 116, R 112, R 107.
3. Capacitors C 114, C 115, C 111, C 135, C 116, C 113, C 112, and C 118.
4. Resistance of the L 105 choke.
5. Contacts of the P 103 switch.

Replace the defective L 105 choke, resistors and capacitors.

When replacing the C 114 capacitor it is necessary to unscrew the L 102 tube holder and to remove the tube.

Unsolder the leads of the resistor R 115 marked with black and yellow stripes when replacing the L 105 choke. Unsolder at the L 105 choke the leads marked with four black stripes as well as the lead passing to the control grid of the L 103 vacuum tube. Unscrew the ~~three~~ screws attaching the panel with R 115, L 105, C 119 and C 114, remove the panel and replace choke L 105.

Re-check the stage after repairing all the defects. Start to ascertain defects of the output stage as soon as it has been found that the buffer stage is operating properly.

Carry out the procedures outlined in the paragraph s checking with the location of defects of the output stage if the master oscillator and the buffer stage are operating properly and if the r.f. voltage at the L 103 control grid is found to be within the limits but if there is no current passing through the artificial antenna.

SECRET
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S E C R E T
NO FOREIGN DISSEM

- 20 -

50X1

Table 7.

L 102 Vacuum tube socket voltages measured on the
chassis with transmitter switched to RT transmission
and operating at 100% power output.

Unit No.	Ope- rati- on mo- de	Fre- quen- cy kc	Vacuum tube socket voltages V				Instrument type required
			Suppre- sor grid volt.	Screen grid voltage	D.C.con- trol grid vol- tage	D.C. plate voltage	
1	Amplifi- cation	2150	24	170	-	320	Tt-1
			24	170	-28	340	Vk-2
		3100	24	170	-	320	Tt-1
			24	170	-28	340	Vk-2
	Freq. doubling	4300	23	220	-25	320	Vk-2
	Amplifi- cation	3600	23	185	-	320	Tt-1
			23	185	-31	320	Vk-2
		6000	22	155	-	320	Tt-1
			23	180	-32	320	Vk-2
2	Freq. doubling	7200	24	210	-	340	Tt-1
			24	220	-34	340	Vk-2
		12000	24	210	-	330	Tt-1
			24	220	-34	340	Vk-2
	Amplifi- cation	3600	23	185	-	320	Tt-1
			23	185	-31	320	Vk-2

Location of defects of output stage.

The location of defects is effected in the following order:

1. Check the socket voltages of the L 103 vacuum tube /Table 8/
2. Check the resistors R 110, R 113, R 217, R 218, R 219, R 220 and R 221 /in the power unit/, capacitors C 124, C 128, C 119, C 121, C 125, C 126, C 127, C 129, C 131 and C 132, the contacts of the E 102 and E 103 relays as well as the contacts of the P 102, P 104, P 105 and "PS-PR" switches.
3. The L 106 and L 109 chokes.

S E C R E T
NO FOREIGN DISSEM

NO FOREIGN DISSEM

50X1

- 21 -

§ 2. Location of defects of modulator.

The location of defects of the modulator is effected in the following order:

1. Switch ON both the audio signal generator and the power unit.
2. Apply a 0,4 V 1000 cycle signal from the audio signal generator through a 50 ohm resistor to the socket "L" of the power unit.
3. Set the P 201 switch installed on the power unit successively to position "1", "2", and "3".
4. Check the A.C. voltage across pin No. 36 of connector G 204 and the chassis using an IV-4 or VKS-7A instrument. This voltage should be between 82-98 V with the switch in position "1", 55-65 V with the switch set to position "2" and 27-33 V when switched to "3".

If the voltage across pin No. 36 and the chassis is zero or if its value differs from the given values with the switch in position "1", check the following:

- 1/The socket voltages of the L 201 vacuum tube /see Table 1/.
- 2/The contacts of the automatic cut-off switch P 203 as well as of the switch P 201.
- 3/Resistors R 202, R 203, R 204, R 205, R 206, R 208, R 209, R 210, R 211, R 212, R 213, R 207 and R 227.
- 4/Capacitors C 206, C 207, C 208, C 205 and C 204.
- 5/Chokes L 201, L 202, L 203 and L 204.

Replace defective resistors and capacitors. Rewind defective windings of the chokes according to the data given in Suppl. 4.

NO FOREIGN DISSEM

NO FOREIGN DISSEM

- 22 7

50X1

T a b l e 8 .

L 103 vacuum tube socket voltages measured on the chassis with transmitter switched to RT transmission and operated at 100% power output.

Unit No	Operation mode	Frequency kc	Vacuum tube socket voltages V				Instrument type required
			Supres- sor grid voltage	Screen grid volt.	Control grid voltage	Plate voltage	
1	Amplifi- cation	2150	-78	280	-	900	Tt-1
			-88	290	-72	980	Vk-2
		3100	-80	300	-	900	Tt-1
			-90	300	-65	1000	Vk-2
	Freq. doubling	4300	-70	280	-	900	Tt-1
			-80	280	-58	960	Vk-2
2	Amplifi- cation	3600	-65	265	-	900	Tt-1
			-78	285	-63	940	Vk-2
		6000	-68	280	-	920	Tt-1
			-78	285	-60	950	Vk-2
	Freq. doubling	7200	-75	290	-	920	Tt-1
			-86	300	-60	1000	Vk-2
		12000	-78	290	-	920	Tt-1
			-86	305	-54	1000	Vk-2

§ 3. Location of defects of antenna tuning unit.

Location of defects of the tuning indicator circuit.

1. Connect the power unit to the r.f. unit , to the antenna tuning unit, to the artificial antenna and to the panel.
2. Set the switch P 301 of the antenna tuning unit to "OFF".
3. Switch ON the radio transmitter and check the current of the low tension circuit as well as the voltage of the "350 V" circuit. If the current exceeds 31 A, check the following:

1/Relays E 301 and 302.

2/Resistors R 304, R 303, R 302 and R 301.

NO FOREIGN DISSEM

NO FOREIGN DISSEM

- 23 -

3/Capacitors C 303 and C 304.

50X1

4/The condition of the circuit assembly in the low tension circuits and in the antenna tuning unit.

Check the resistance between the individual socket terminals of the vacuum tubes L 301 and L 305 and the chassis if the voltage of the "+350 V" circuit decreases sharply when switching 6N the transmitter /Table 9/.

Repair all the defects detected in both the high and the low tension circuits of the antenna tuning unit.

Set the switch "TLF-TLG" to "TLF".

Tune the radio transmitter to one of the frequencies given in Table 3. The pointer of the indicator I 301 should swing to 3-6 graduation in the course of the tuning process.

If the indicator does not operate, or if its reading is smaller than the given values, check the following:

1/The condition of the indicator I 301.

2/The socket voltages of the vacuum tube L 301 /Table 10/.

3/Resistor R 115 and capacitor C 131 /in the r.f. unit/.

4/Resistors R 321, R 301, R 302, R 324 and R 326.

5/Capacitors C 330, C 323, C 304, C 303 and C 320.

Replace the defective resistors and capacitors.

When replacing these components /Fig.6/ follow the procedure outlined below:

1. Unscrew the two set screws of the antenna tuning unit P 301 switch.
2. Remove the knob of the switch P 301.
3. Unscrew the four screws attaching the chassis of the crystal calibrator.
4. Remove the crystal calibrator chassis from the antenna tuning unit.
5. Replace defective components.

Select the resistors R 326 and R 324 so that the indicator I 301

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/Suppl.1/ reading within 3 - 6 graduations in the course of tuning. Having ascertained that the indicator is functioning properly, start looking for defects of the side tone circuit.

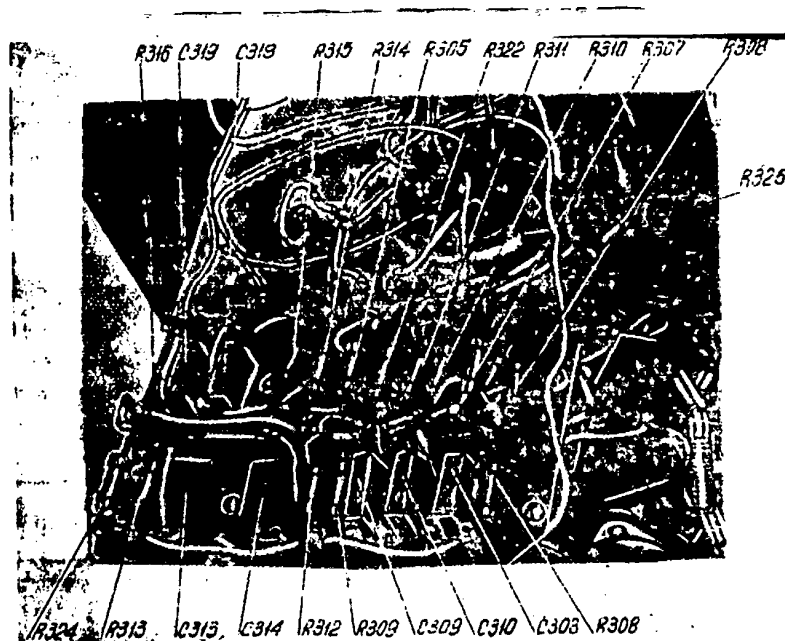


Fig. 1. Location of components on the crystal oscillator chassis / bottom view.

S E C R E T
NO FOREIGN DISSEM

50X1

- 25 -

T a b l e 9.

Mean vacuum tube socket resistance values
measured on the transmitter chassis.

Item No.	Stage	Tube type	Socket terminal No.								Plate	Control grid
			1	2	3	4	5	6	7	8		
1	Master oscill.	G411	-	3	-	33000	-	-	59	500	17000	10000
			ohms			ohms			ohms	ohms	ohms	ohms
2	Buffer stage	G411	-	58	-	17000	-	-	30	500	150000	98000
			ohms			ohms			ohms	ohms	ohms	ohms
3	Power amplifier L 103	G471	-	-	-	150000	-	-	-	-	-	-
						ohms						
4	Rectifier L 104	6SA7	-	0	0	33000	33000	-	20	33000	-	-
						ohms	ohms		ohms	ohms		
5	Modulator L 201	6N7	0	0	2	120	2000	750	-	0	-	-
						Megohms	ohms	ohms				
6	Audio signal generator and rectifier L 102	6N7	0	0	0	50000	200	180	-	0	-	-
						50000	ohms	ohms	ohms	ohms		
7	A.f. amplifier L 305	6N7	0	180	-	500000	-	-	-	0	-	-
						500000	ohms					
8	1000 kc X-tal oscillator L 301	6N7	0	-	-	-	33000	-	-	-	-	-
							ohms					
9	200 kc X-tal oscillator L 302	6SA7	0	-	-	-	43000	-	-	100000	-	-
						180	ohms			ohms		
10	40 kc X-tal oscillator L 303	6SA7	0	-	-	-	45000	-	-	150000	-	-
							ohms			ohms		
11	20-10 kc X-tal oscillator L 304	6SA7	0	0	-	-	160000	-	-	95000	-	-
							ohms			ohms		

S E C R E T
NO FOREIGN DISSEM

NO FOREIGN DISSEM 26

T a b l e 10.50X1

Socket voltages of the antenna tuning unit vacuum tubes measured on the transmitter chassis.

Item No	Stage	Tube type	Vacuum tube socket voltages V							P 301 switch position
			1	2	3	4	5	6	7	
1	1000 kc X-tal oscillator L 301	6SA7	0	12,5	26	130	-30	7,5	7,5	-3 "Kor"
2	200 kc oscillator L 302	6SA7	0	25	50	76	-5	6,5	19	-3,4 "40 kc"
3	40kc oscillator L 303	6SA7	0	19	21	74	-2	6,8	13	-3,4 "40kc"
4	20-10kc oscillat. L 304	6SA7	0	0	60	75	0,5	7	7	-3,5 "20-10kc"
5	A.f.amplifier L 305	6N	0	25	15	0,6	-2	160	19	0 "OFF"

Note: The measurement should be carried out with the aid of the VK-2 vacuum tube voltmeter.

Location of defects of side tone circuit.

1. Switch ON the radio transmitter and tune it to any frequency in the band.
2. Set the "TLF-TLG" and "100% - 25%" switches to "TLF" and "100%" respectively. Set the antenna tuning unit switch to OFF.
3. Connect a TA-3 headset to the sockets "T" on the panel and connect a VKS-7 /or IV-4/ voltmeter in parallel to the headset.
4. Voltmeter should indicate a value between 20 - 30 V with a load and steady sound applied to the throat microphone. If there is no tone in the headphones, or if the voltage

SECRET
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S E C R E T
NO FOREIGN DISSEM

- 27 -

50X1

is less than 20 V, check the following:

- 1/The socket voltages of the L 305 vacuum tube /Table 10/
- 2/Resistors R 318, R 317, R 320, R 319, R 325, R 223, R 224 and R 225 /in the power unit/.
- 3/Capacitors C 320, C 329, C 325, C 134 and C 211 /in the power unit/.
- 4/Set the "TLG-TLF" switch to "TLG". A 600 - 1100 cps tone should be heard in the headphones. If this is not the case, check the following:
 - a/Capacitor C 213 /in the power unit/.
 - b/Resistor R 222.

Replace defective capacitors and resistors. After rectifying ascertained defects and making sure that the side tone circuit is operating properly, check the crystal calibrator, for proper operation. Take the following steps for this purpose:

- 1/ Switch ON the transmitter by means of the switch P 102 and tune it to a frequency which is a multiple of 1000 kc /3000, 4000, 5000 kc etc./
- 2/ Set the switch P 301 to "KOR".
- 3/ Listen to the beat frequency signal resulting from the set transmitter frequency and the 1000 kc oscillator frequency in the headphones, turning the knob "Frequency" in both directions from its set position. Start with locating defects of the 1000 kc if the zero beat is heard.

Location of defects of 1000 kc oscillator.

Check the following in the course of locating defects of the crystal oscillator /1000 kc oscillator/:

1. The crystal, by replacing it /the location of the crystal calibrator circuits is shown in Fig. 7.
 2. The socket voltages of the vacuum tube L 301 /Table 10/
- The socket voltages of the vacuum tube L 301 are checked with the aid of an adapter /Suppl.5/.

NO FOREIGN DISSEM

NO FOREIGN DISSEM

- 28

3. Capacitors C 301, C 302, C 303, C 326, C 305. 50X1
4. Resistors R 321, R 303, R 304, R 323.
5. The contacts of the switch P 301.

Replace defective capacitors and resistors. Adjustment of the 1000 kc oscillator should be carried out after rectifier all defects.

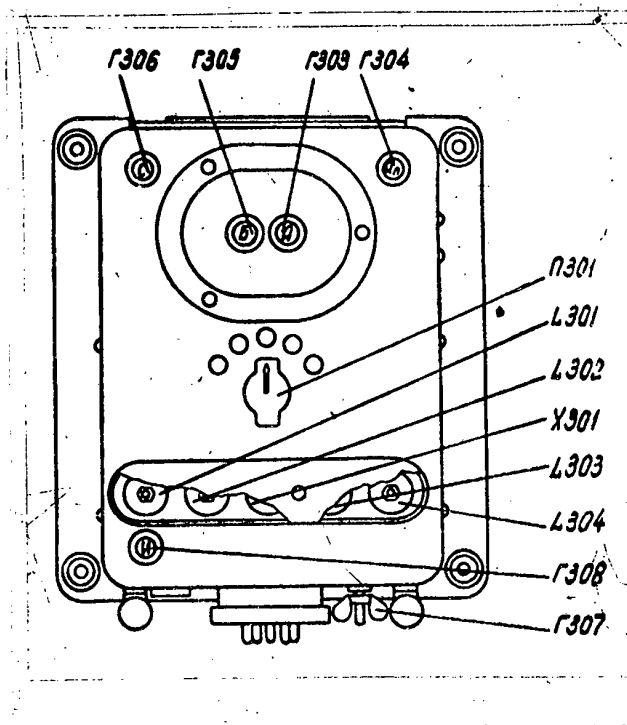


Figure 7: Location of the crystal and of the crystal calibrator tuned circuits.

Location of defects of 200 kc oscillator.

1. Set a frequency of the unit dial which is a multiple of 200 kc /3200, 3400, 5200 kc etc./
2. Set the switch P 301 to "40".
3. Remove the vacuum tube L 303 from its socket /40 kc oscillator/, short circuit its pins Nos.3 and 4 by means of a lead and put vacuum tube in place.
4. Depressing the toggle of the switch P 102 to the left, switch ON the radio transmitter.
5. Listen to the beat frequency signal in the headphones,

NO FOREIGN DISSEM

SECRET
NO FOREIGN DISSEM

- 29 -

50X1

turning the knob "Frequency" in both directions from its set position.

6. Check the r.f. unit for calibration accuracy /see chapter V. § 5/ and the crystal calibrator for correct adjustment in the zero beat is obtained at a frequency other than the set frequency. The r.f. unit calibration procedure is given in chapter IV. § 2.
7. If the zero beat is not heard, check the following:
 - 1/The socket voltages of the vacuum tube L 302 /Table 10/.
 - 2/Resistors R 306, R 307 and R 308,
 - 3/Capacitors C 306, C 308, C 310 and C 307.
 - 4/The resistance of the inductor L 307.
 - 5/The contact of the switch P 301.

Replace defective capacitors and resistors.

Make sure that the 200 kc oscillator is operating properly and check the 40, 20 and 10 kc oscillators after removing the lead short circuiting pins Nos. 3 and 4 of the L 303 vacuum tube.

Location of defects in the 40 kc, 20 kc and 10 kc oscillator circuits.

1. Set a frequency of the unit dial the last digits of which are divisible by 40 kc /e.g. 6340, 6380, 6420 kc etc/
2. Remove the vacuum tube L 304 /20 and 10 kc oscillator/ from its socket and connect pins Nos. 3 and 4 by means of a suitable lead. Put the vacuum tube in place again.
3. Depress the toggle of the switch P 102 to the left and adjust the radio transmitter.
4. Listen to the beat frequency signal in the headphones, turning the knob "Frequency" in both directions from its set position.
5. Check the calibration of the r.f. unit for accuracy and the

SECRET

50X1

- 30 -

crystal calibrator for correct adjustment if the zero beat is not heard at the set frequency.

6. If no beat frequency signal is heard in the headphones, check the following:

- 1/The socket voltages of the vacuum tube L 303 /Table 10/
- 2/Resistors R 309, R 310, R 311 and R 312.
- 3/Capacitors C 309, C 312, C 314, C 328 and C 311.
- 4/Resistance of the inductor L 302.

Replace defective resistors and capacitors.

As soon as it is ascertained that the 40 kc oscillator is operating properly, start looking for defects in the 20 and 10 kc oscillator circuits. The lead shorting the pins Nos. 3 and 4 of the vacuum tube L 304 should be removed before hand. Location of defects in the 20 and 10 kc oscillator circuits is accomplished by following the procedures outlined for the 1000, 200 and 40 kc oscillators. The switch P 301 is set in the individual cases to a position corresponding to the oscillator /20 and 10 kc/. In ^{the} case of failure of the 20 and 10 kc oscillator, check the following:

- 1/ The socket voltages of the vacuum tube L 304 /Table 10/
- 2/ Resistors R 313, R 314, R 315 and R 316.
- 3/ Capacitors C 313, C 317, C 318, C 319, C 315 and C 316.
- 4/ The resistance of the inductors L 303 and L 304.
- 5/ The contacts of the switch P 301.

Replace the defective resistors and capacitors and check the 20 and 10 kc oscillator once more.

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50X1

IV. TRANSMITTER ADJUSTMENT.

§ 1. Relay adjustment.

The starting relay E 202 and the step-start relay E 201 should be adjusted in the following order:

1. Assemble a test circuit /Fig.8/
2. Unsolder the end of the relay winding.
3. Remove the relay from the mounting panel on the power unit chassis.
4. Adjust the supply voltage of the relay E 202 within 4,5 - 5,5 V and within 15 - 18 V for the relay E 201.
5. Positive double action of the relay should be obtained by means of adjustment of the relay set screw.

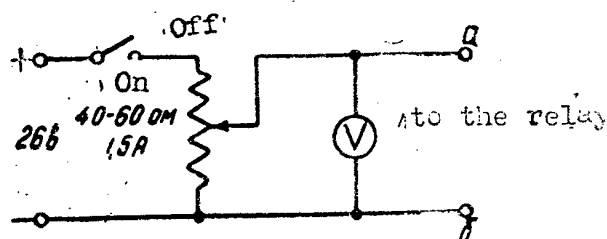


Figure 8: Relay adjustment circuit .

1/OFF, 2/ON, 3/to the relay.

6. Adjust the relay cut-in voltage within 4,5 - 5,5 V for the relay E 202 and within 15 - 18 V for the relay E 201 depressing or stretching its spring.
7. Secure the relay armature and apply a cellulose lacquer coating to the screw joints after the adjustment of the relays E 202 and E 201 is finished.

Adjust the relay E 301 in the following manner:

- 1/Unsolder the lead ends from the relay E 301.
- 2/Remove the relay from the antenna tuning unit chassis.
- 3/Connect lead "a" terminated with a test point to the left

SECRET

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terminal of the relay coi

Connected lead "b" terminated with a test point to the left terminal of the relay coil E 301. 50X1

- 4/Adjust relay supply voltage within 16 - 18 V.
- 5/Adjust smooth travel of the relay armature with the aid of the screws located at the side of the relay.
- 6/Adjust the relay cut-in voltage within 16 - 18 V by means of shifting the relay core.

Secure the relay core and apply a coating of cellulose lacquer to the lock nuts after the adjustment is finished.

The adjustment of the relay E 102 switching the antenna tuning unit to the r.f. unit as well as the adjustment of the relay E 103 switching the circuit from series to parallel connection differs in no respect from the adjustment of the relay E 301.

Adjustment of the receiver input cut-off relay E 302 should be carried out in the following order:

1. Unsolder the leads from the relay E 302.
2. Remove the relay from the antenna tuning unit chassis.
3. Connect the test point of lead "a" to the left terminal of the coil of the E 302 relay.
4. Connect the test point of lead "b" to the right terminal of the coil of the E 302 relay.
5. Adjust the relay supply voltage within 12 - 14 V.
6. Adjust the relay cut-in voltage within 12 - 14 V by means of shifting the relay core.
7. Adjust the relay armature travel within 0,4 - 0,6 mm by means of bending the plate limiting the armature travel. Adjust the gap between the armature and the bracket equal to 0,2 mm.

In the course of this adjustment the armature should move freely without seizing. Secure the relay core and apply a cellulose lacquer coating to the lock nuts.

Adjustment of the relay E 101, switching ON the r.f. unit, is in no respect different from the adjustment of the relay E 302.

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§ 2. Calibration adjustment of the r.f. units.

Calibration adjustment of the r.f. units should be accomplished at the test frequencies given in Table 11 with the stage operating in the amplification mode.

Table 11.

Test frequencies for calibration adjustment
of the r.f. units.

Unit No.	Test frequency kc	Permissible error frequency set without the aid of X-tal calibrator	Permissible error frequency set with the aid of X-tal calibrator	Method of operation
		kc	kc	
1	2150	1,930	0,430	Amplification
	2250	2,000	0,450	
	2820	2,580	0,570	
	3000	2,700	0,600	
	3600	3,240	0,720	
2	3600	3,20	0,72	Amplification
	4000	3,60	0,80	
	4800	4,30	0,96	
	5000	4,50	1,00	
	6000	5,40	1,20	

The adjustment is effected in the following order:

1. Switch ON the transmitter and allow a period of 5 minutes for it to warm up.
2. Switch ON the type 526 heterodyne frequency meter and allow a period of 10 to 15 minutes for it to warm up. Tune the frequency meter to 3000 kc.
3. Tune the transmitter to 3000 kc according to the frequency unit dial.
4. Set the switch P 301 of the antenna tuning unit to "OFF".
5. Locate the antenna of the heterodyne frequency meter near the master oscillator.

SECRET
NO FOREIGN DISSE

- 34 -

50X1

6. Switch ON the transmitter by means of depressing the toggle of the switch P 102 to the left.
7. Determine with the aid of the heterodyne frequency meter the set radio transmitter frequency.
8. Calculate the calibration error of the transmitter from the frequency set on the dial of the unit and from the frequency reading of the heterodyne frequency meter.
The calibration error of the transmitter should not exceed the limits /Table 11/. The calibration should be adjusted, following the procedures outlined in p. 9 to 13.
Check the transmitters, the calibration error of which is within the permissible limits, at all the other frequencies given in table 11.
9. Align the gauge line of the r.f. unit sight with the dial graduation corresponding to the frequency of 3000 kc.
10. Tune the heterodyne frequency meter to 3000 kc.
11. Open the cover designated "KOR" on the front panel of the unit. Turn the adjustment capacitor C 103 carefully to the right and left, using a screw driver, and adjust it to a position resulting in the zero beat in the headphones connected to sockets "T" of the heterodyne frequency meter.
12. Close the cover designated "KOR" on the front panel of the unit. Check the calibration accuracy of the transmitter at the remaining frequencies given in Table 11.
Carry out the calibration adjustment following the procedure given below if the calibration accuracy, adjusted by means of the adjustment capacitor C 103, is out of the limits at the other frequencies within the transmitter band.
13. Align the gauge line of No.1 r.f. unit sight with the dial graduation corresponding to 3600 kc.

SECRET

NO FOREIGN DISS

- 35 -

50X1

14. Tune the heterodyne frequency meter to 3.600 kc
15. Remove the shield from the variable capacitor C 101 of the master oscillator located in the r.f. unit. Turn the rotor of the adjustment capacitor C 102 to a position resulting in the zero beat at 3600 kc using a special tool /Suppl.6/
16. Align accurately the gauge line of the r.f. unit sight with the dial graduation corresponding to 2150 kc .
17. Tune the heterodyne frequency meter to 2150 kc.
18. Adjust inductor L 101 core to a position resulting in the zero beat in the headphones, turning it carefully by means of a screw-driver.
19. Check the calibration accuracy of the transmitter at the remaining frequencies given in table 11. Adjust the calibration at these frequencies if necessary, following the procedure outlined below.
 - 1/Tune both the transmitter and the heterodyne frequency meter to 3000 kc. Adjust the zero beat in the headphones, bending with extreme care the small outer plates of the C 101 capacitor stator.
 - 2/Check the calibration accuracy of the transmitter at 2320 and 2250 kc, applying the same method.
20. The calibration adjustment of No.2 unit operating in the 3,6 - 12 mc band as well as the adjustment procedure are exactly the same at those applied in the case of No.1 unit operating in the 2,15 - 7,2 mc band.
21. Check the calibration accuracy of the transmitter following the procedure outlined in 1 to 8 and repeat the adjustment, if necessary.

Align the buffer stage with the master oscillator frequency after the calibration adjustment of the master oscillator is finished.

SECRET
NO FOREIGN DISSEM

NO FOREIGN DIS

- 36 -

50X1

§ 3. Alignment of the buffer stage and master oscillator frequency.

Alignment of the buffer stage and master oscillator frequency is accomplished with the buffer stage switched to frequency doubling /Table 12/.

Table 12.

Alignment frequencies of the buffer stage and master oscillator.

Unit No.	Operation mode	F r e q u e n c i e s		
		kc	kc	kc
1	Frequency doubling	7200	4300	6000
	Amplification		2800	
2	Frequency doubling	12000	7200	9000
	Amplification		4800	

The adjustment is effected as follows:

1. Connect the transmitter to the panel and to the artificial antenna.
2. Switch ON the transmitter, depressing the toggle of the P 102 switch to the left.
3. Tune the master oscillator to 7200 kc with the aid of the heterodyne frequency meter.
4. Turning the rotor of the adjustment capacitor C 113, adjust it to a position resulting in minimum plate current of vacuum tube L 102 and in maximum control grid current of the vacuum tube L 103.
5. Tune the master oscillator to 4300 kc with the aid of the heterodyne frequency meter.

SECRET

NO FOREIGN DISSEM

- 37 -

50X1

6. Tune the buffer stage to 4300 kc by means of turning the core of the inductor L 103.
7. Check the buffer stage adjustment first at 7200 kc and then at 4300 kc. Repeat the adjustment of the stage, if necessary.
8. Secure the core of the inductor L 103, applying a cellulose lacquer coating.
9. Tune the master oscillator to 6000 kc with the aid of the heterodyne frequency meter.
10. Adjust the buffer stage to 6000 kc by bending the small outer plates of the capacitor stator C 112.
11. Switch the transmitter to amplification mode and tune the master oscillator to 2800 kc.
12. Adjust the buffer stage to 2800 kc, turning the core of the inductor L 104.
13. Check the buffer stage adjustment at 600 kc and 2800 kc. Repeat the adjustment, if necessary.
14. Secure the core of the inductor L 104 applying a cellulose lacquer coating.

Alignment of the 2nd unit buffer stage with the master oscillator frequency is accomplished following the same procedure as applied in the case of the 1st unit. This adjustment is carried out at the frequencies given in Table 12.

§ 4. Adjustment of the transmitter crystal calibrator.

1. Connect the transmitter to the panel and to the artificial antenna.
2. Check the accuracy of the frequency setting, carried out

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NO FOREIGN DISSEM

- 38

with respect the dial graduations, tuning the transmitter^{50X1} to different frequencies with the aid of the crystal calibrators.

3. Carry out crystal calibrator oscillator adjustment if the antenna tuning unit switch is set to "40", "20" and "10" and noise is heard in the headphones with the zero beat at another setting of the r.f. unit dial than that corresponding to the test frequency.

Adjustment of the crystal calibrator oscillators is carried out with the aid of an equivalent load of the power unit replacing the r.f. unit.

The adjustment is carried out in the following order:

- 1/ Correct the frequency of the 1000 kc oscillator.
- 2/ Adjust the 200 kc oscillator.
- 3/ Adjust the 40 kc oscillator.
- 4/ Adjust the 20 kc oscillator.
- 5/ Adjust the 10 kc oscillator.

Correction of the 1000 kc oscillator frequency.

1. Assemble the circuit shown in Fig. 9.
2. Set the switch of the antenna tuning unit to "KOR".
3. Switch ON the supply of the transmitter, oscilloscope and heterodyne frequency meter.
4. Tune the heterodyne frequency meter to 2000 kc and apply its output voltage to one pair of the oscilloscope deflection plates.
5. Apply the signal from the control grid of the 1000 kc oscillator vacuum tube to the other pair of the oscilloscope deflection plates. An image should then appear on the CRT screen resembling the figure eight /Fig.10/. Turn the rotor of the C 302 adjustment capacitor so as to get the

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NO FOREIGN DISSEM

figure eight on the screen if it was not there before.

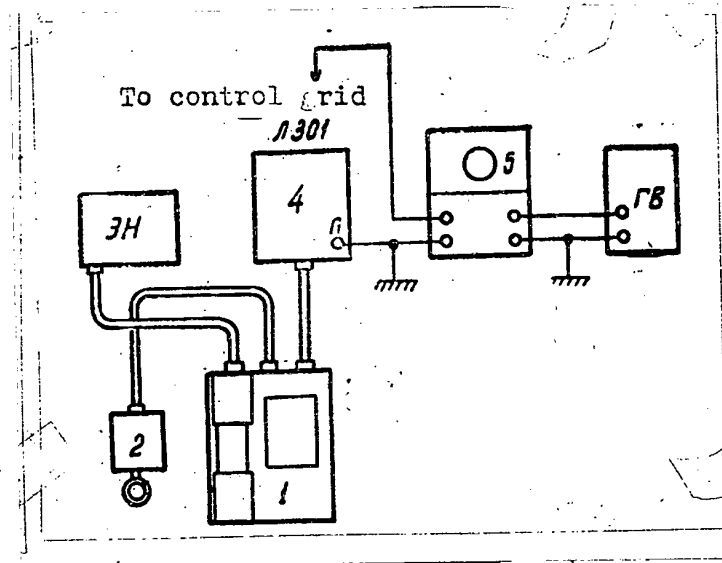
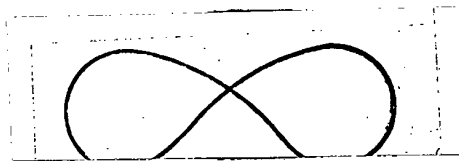


Figure 9: Block diagram of the instruments required for the checking and calibration of the 1000 kc crystal calibrator.

1/Power unit, 2/Control box, 4/antenna tuning unit, 5/Cathode ray oscilloscope, EN/Equivalent load of the power unit, GV/Heterodyne frequency meter.

Check the operation of the crystal calibrator simultaneously with the transmitter, following the procedure outlined in p. 1, 2 and 3 after the correction of the 1000 kc oscillator is completed.

Figure 10: CRO screen image appearing in the course of the checking and calibration of the 1000kc crystal calibrator.



Adjustment of the 200, 40, 20 and 10 kc
oscillators.

1. Assemble the circuit shown in Fig.11.
2. Set the antenna tuning unit switch to "40".
3. Remove the vacuum tube L 302 from its socket in the antenna

NO FOREIGN DISSEM

- 40 -

tuning unit and plug an adapter with the vacuum tube 6SA7
50X1
in its place /Suppl.5/.

4. Switch on the supply of the transmitter, the cathode ray oscilloscope and the audio signal generator.

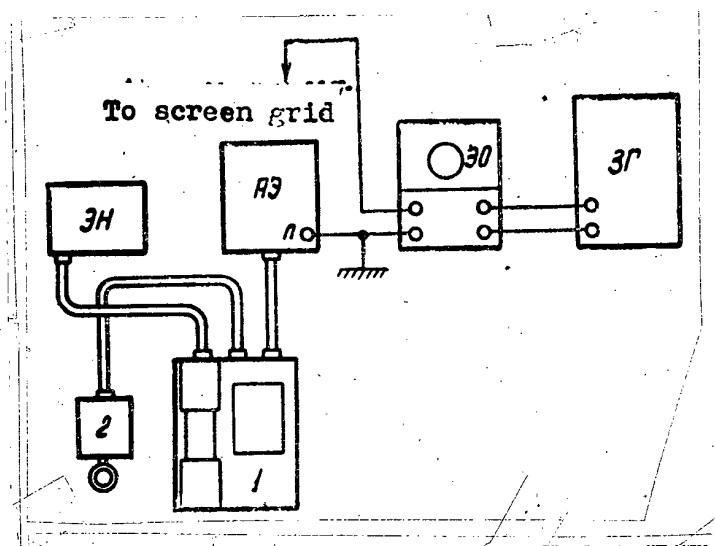


Figure 11: Block diagram of the instruments required for adjustment of the 200, 40, 20 and 10 kc oscillators of the crystal calibrator.

1/Power unit, 2/Control box, AE/Antenna tuning unit, EO/Cathode ray oscilloscope, ZG/Audio signal generator, EN/Equivalent load of the power unit.

5. Apply a signal from the screen grid of the 200 kc oscillator vacuum tube to one pair of the oscilloscope deflection plates.
6. Set the frequency of the audio signal generator to 20 kc and apply its output signal to the other pair of the oscilloscope deflection plates.
7. Turn the audio signal generator scale both directions from the position fixing the 20 kc frequency so as to obtain on the oscilloscope screen an image similar in shape to that shown in fig. 12,4.
8. Turn the inductor L 301 core anti-clockwise till oscilla-

SECRET
NO FOREIGN DIS
- 41 -

50X1

tion failure, indicated by the image disappearing from the screen, or fully anti-clockwise if there is no oscillation failure.

9. Turn the core clockwise, counting the number of half turns /this number should not be less than 12/ to oscillation failure, or to the extreme clockwise position if there is no oscillation failure.
10. Turn the core anti-clockwise to half the number of half turns required for shifting the core from one of its extreme positions to the other, i.e. set the core to the centre of the synchronisation range.
11. Secure the core by means of a lock nut and apply a coating of cellulose lacquer to the screw joints.

Adjustment of the 40, 20 and 10 kc oscillators is carried out in the same way as that of the 200 kc oscillator. The images obtained on the oscilloscope screen in the course of the adjustment of the individual oscillators are shown in Fig. 12.

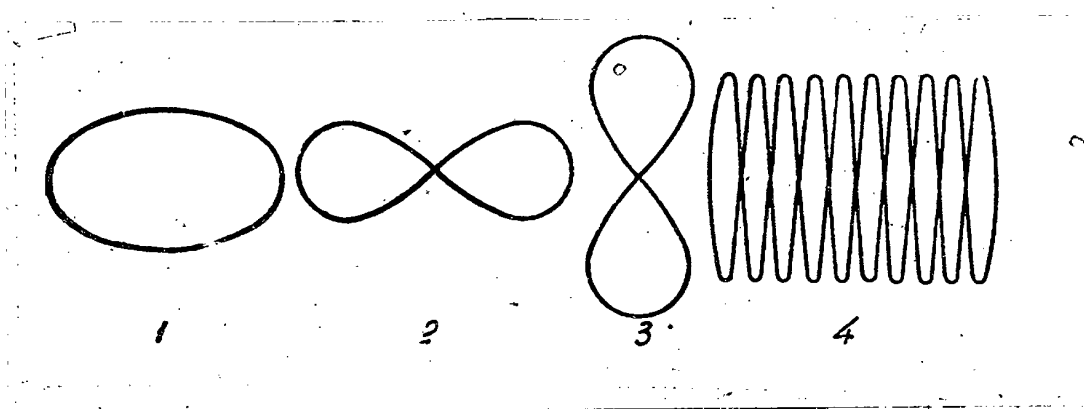


Figure 12: Images appearing on the CRO screen in the course of the 200, 40, 20 and 10 kc oscillator adjustment of the crystal calibrator.

- | | | | |
|---|---|---|---|
| 1/CRO screen image in the course of the 20 kc oscillator adjustm. | | | |
| 2/CRO screen image in the course of the 10 kc | - | " | - |
| 3/CRO screen image in the course of the 40 kc | - | " | - |
| 4/CRO screen image in the course of the 200 kc | - | " | - |

S E C R E T
NO FOREIGN DISSEM

50X1

- 42 -

40, 20 and 10 kc oscillator adjustment data are given in Table 13.

T a b l e 13.

Adjustment data of the 40, 20 and 10 kc
oscillators.

Item No.	Oscillator checked	Vacuum tube Ref. Symbol	Oscillator frequency kc	Heterodyne frequency meter frequency kc	Audio signal generator frequency kc	Switch position	Adjusted circuit
1	1000 kc osc.	L 301	1000	2000	-	"KOR"	C 302
2	200 kc osc.	L 302	200	-	20	40	L 301
3	40 kc osc.	L 303	40	-	20	40	L 302
4	20 kc osc.	L 304	20	-	20	20	L 303
5	10 kc osc.	L 304	10	-	20	10	L 304

V. CHECKING OF THE TRANSMITTER AFTER REPAIR!

The following parameters of the radio transmitters should be checked after the repair:

1. Resistance to vibration
2. External appearance and condition of the assembly.
3. Operation of the transmitter and current drawn by the low tension circuits.
4. Power output dissipated in the artificial antenna.
5. Calibration accuracy.
6. Modulation depth.
7. Transmitter and crystal calibrator beat frequency signal amplitude.
8. Side tone signal amplitude.
9. Throat microphone supply voltage.
10. Modulator gain.

S E C R E T
NO FOREIGN DISSEM
- 43 -

50X1

§ 1. Checking of vibration resistance.

The transmitter is checked for resistance to vibration on a vibration table set to vibrate at 20 cps with an amplitude of 0,1 mm for 15 minutes. The transmitter signal is received during the checking process with transmitter switched to ET as well as to CW transmission and operating at power outputs of 100% and 25%.

There should be no cracks, operation failures, interruptions or disappearing of the signal.

§ 2. Inspection of the external appearance and of the assembly condition.

Inspection of the external appearance and of the assembly condition is accomplished following the procedure outlined in chapter II § 1.

§ 3. Checking of transmitter operation and current drawn by the low tension circuits.

Checking of the radio transmitter operation should be effected in the following order:

1. Connect the transmitter to the panel and to the artificial antenna.
2. Adjust the supply voltage to 26 V.
3. Switch ON the transmitter and tune it to the first of the frequencies given in Table 14, with the transmitter switched to CW transmission and operating at 25% power output.
4. Set the "100% - 25%" switch to "100%" and depress the key. The pointer of the tuning indicator should swing to the right and indicate between 5 - 6 graduations of its dial.

S E C R E T

SECRET
NO FOREIGN DISSE

- 44 -

50X1

5. Set the "TLF-TLG" switch to "TLF".
6. Tune the transmitter so as to obtain the maximum tuning indicator reading.
7. Plug throat microphone leads into the sockets "L" on the power unit and apply a steady loud sound "A". The pointer of the tuning indicator should then swing to the right.
8. Repeat the procedure outlined in 3 to 7 tuning the transmitter to each of the frequencies given in Table 14.
9. Check the current drawn by the low tension circuits with the transmitter switched to CW transmission and operating at 100% power output after checking of the correct operation of the transmitter is completed.

The current drawn should not exceed 31 A.

Table 14.

Transmitter operation test frequencies.

Unit No.	Operation mode	Transmitter operation test frequencies kc	
1	Amplification	2150	3000
	Frequency doubling	5000	7000
2	Amplification	3000	6000
	Frequency doubling	7000	12000

§ 4. Checking of the power output dissipated in the artificial antenna.

Checking of the power output dissipated in the artificial antenna should be carried out at the frequencies given in Table 14. The checking procedure is carried out in the following order:

1. Assemble the circuit shown in Fig. 13.

SECRET

SECRET
NO FOREIGN DISSEM

50X1

2. Switch ON the audio signal generator.
3. Apply a 1000 kc 0,65 V signal from the audio signal generator to the sockets "L" located on the power unit.
4. Adjust the transmitter supply voltage to 26 V.
5. Tune the transmitter, operating at 100 % power output and switched to RT transmission, to 2150 kc.
6. Calculate the power output dissipated in the artificial antenna using the formula $P = I^2 R$ where I is the current, read on the artificial antenna indicator and R is the resistance of the artificial antenna at 2150 kc /see Table 4/.
7. Set the "100% - 25%" switch to "25%".
8. Repeat the procedure outlined in 6.

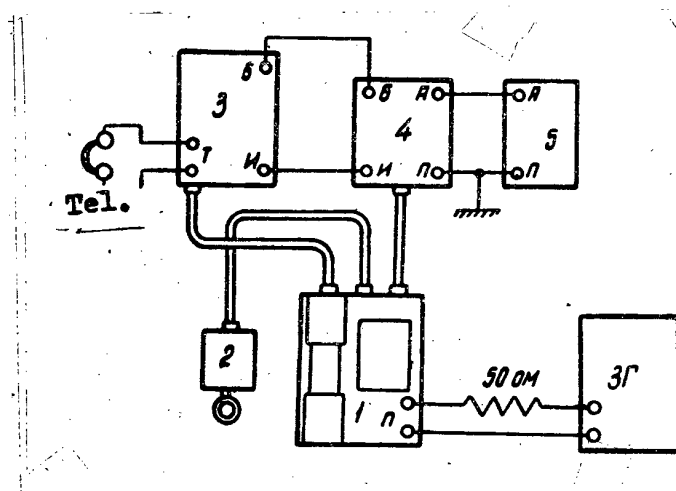


Figure 13: Block diagram of the instruments required for checking of the power output check.

1/Power unit, 2/Control box, 3/R.f. unit,
4/Antenna tuning unit, 5/Artificial antenna,
ZG/Audio signal generator.

9. Determine the power output dissipated in the artificial antenna at the remaining frequencies given in table 14, following the procedure outlined in 5 to 7.
10. Switch OFF the audio signal generator and disconnect it from the circuit.

S E C R E T
NO FOREIGN DISSEM

- 46 -

50X1

11. Check the power output dissipated in the artificial antenna in CW transmission, repeating the procedure outlined in 5 to 9 /with the key depressed/.

The power output dissipated in the artificial antenna should not be less than the value given in the technical requirements /Suppl.3/

§ 5. Checking of calibration accuracy.

Checking of the calibration accuracy is carried out at the frequencies given in Table 15.

The checking procedure is carried out in the following order:

1. Assemble the circuit shown in Fig. 14.
2. Switch ON the transmitter and tune it to 2150 kc.
3. Apply the beat frequency signal from socket "T", located on the pedestal of the r.f. unit, to one pair of the cathode ray oscilloscope deflection plates.

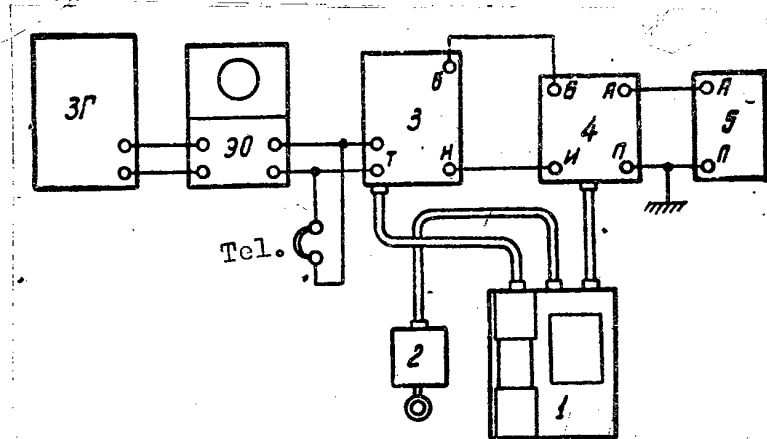


Figure 14: Block diagram of the instruments required for checking of transmitter calibration and frequency adjustment.

1/Power unit, 2/Transmitter control box, 3/R.f. unit, 4/Antenna tuning unit, 5/Artificial antenna, EO/Cathode ray oscilloscope, ZG/Audio frequency generator.

S E C R E T

NO FOREIGN DISSEM

NO FOREIGN DISSEM

50X1

4. Apply an audio frequency signal from the audio signal generator to the second pair of cathode ray oscilloscope deflection plates.
5. Tune the audio signal generator, changing its frequency to a frequency at which the image shown in Fig. 15 appears on the cathode ray oscilloscope screen.

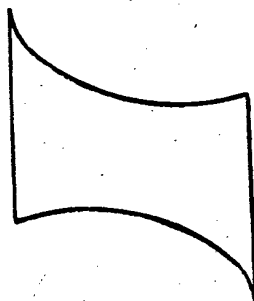


Figure 15: CRO screen image appearing in the course of the transmitter frequency adjustment and checking of calibration error.

6. Read the frequency set on the audio signal generator dial. This frequency should not exceed 2,00 kc.
7. Check the calibration of the transmitter at the remaining frequencies given in Table 15.

NO FOREIGN DISSEM

SECRET
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50X1

Table 15.

Transmitter calibration accuracy test frequencies.

Test frequen- cy kc	Permissible error		Operation mode
	Frequency set without the aid of X-tal cali- brator kc	Frequency set with the aid X-tal calibra- tor kc	
2150	2,00	0,40	Amplification
2250	2,00	0,50	
2870	2,60	0,60	
3000	2,70	0,60	
3600	3,30	0,70	
4300	3,90	0,90	Frequency doubling
5000	4,50	1,00	
6000	5,40	1,20	
7000	6,30	1,40	
7200	6,40	1,50	
3600	3,20	0,70	Amplification
4000	3,80	0,80	
4800	4,30	0,96	
5000	4,50	1,00	
6000	5,40	1,20	
7200	6,40	1,44	Frequency doubling
8000	7,20	1,60	
9000	8,10	1,80	
10000	9,00	2,00	
12000	10,80	2,40	

§ 6. Checking of modulation depth.

Checking of the modulation depth is carried out with the aid of the IM-8 modulation depth meter and following both Table 15 and the diagram shown in fig.16.

NO FOREIGN DISSEM

49

50X1

Table 16.

Transmitter modulation depth test frequencies.

Unit No.	Operation mode	Modulation depth test frequency kc	IM-8 coupling coil required for the check	Note
1	Amplification	2150, 2670 3600	No. 3	Check at 100% power output RT transmission
	Frequency doubling	4300, 6000 7200	Nos. 3 and 4	
2	Amplification	3600, 4800, 6000	No. 4	Check at 100% power output, RT transmission
	Frequency doubling	7200, 9000, 12000	No. 4	

The checking procedure should be carried out in the following order:

1. Switch ON the modulation depth meter. Connect a coupling coil of the corresponding range to the modulation depth meter.
2. Switch ON the transmitter and tune it to 2150 kc.
3. Switch ON the audio signal generator.
4. Apply a 1.0 V 1000 cps signal from the audio signal generator through a 50 ohms resistor to the socket "L" of the power unit.
5. Determine the modulation factor.
6. Check the modulation factor, tuning the transmitter to the remaining frequencies given in Table 16. The modulation factor should not be less than 90 - 100%.

§ 7. Checking of the transmitter and crystal calibrator beat frequency signal amplitude.

The checking procedure is carried out following Table 17

SECRET

NO FOREIGN DISSEM

- 50 -

50X1

and Figure 17. Proceed in the following order:

1. Connect the VKS-7 or IV-4 voltmeter and a ICc-5 frequency meter to the sockets "T" on the panel.
2. Adjust the transmitter supply voltage to 26 V.
3. Tune the transmitter to 2150 kc according to the zero beat of the transmitter and crystal calibrator signals.
4. Adjust the beat frequency of the transmitter and crystal calibrator to $\pm$ 100 cps, according to the ICc-5 frequency meter reading, changing the transmitter frequency.
5. Read the beat frequency signal amplitude of the transmitter and crystal calibrator on the VKS-7 voltmeter.

The beat frequency signal amplitude under the given conditions of the checking procedure should not be less than 15 V. Check the beat frequency signal amplitude at the remaining frequencies given in Table 17, repeating the procedure outlined in 4 and 5.

Table 17.

Frequencies at which the transmitter and crystal calibrator beat frequency signal amplitude is checked.

Unit No.	Operation mode	Test frequencies at which the beat frequency signal amplitude is checked kc	Note
1	Amplifikation Frequency doubling	2150, 2870, 3600 4300, 6000, 7200	Check at 100% power output RT transmission
2	Amplifikation Frequency doubling	3600, 4800, 6000 7200, 9000, 12000	Check at 100% power output RT transmission

SECRET
NO FORN DISSEM

- 51 -

50X1

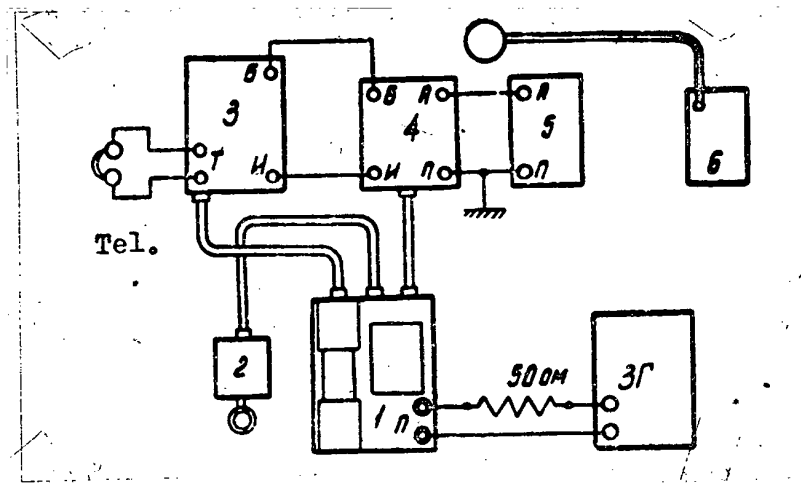


Figure 16: Block diagram of the circuit for checking of the modulation depth.

1/Power unit, 2/Transmitter control box, 3/R.f. unit, 4/Antenna tuning unit, 5/Artificial antenna, 6/IM-8 modulation depth meter, ZG/Audio signal generator.

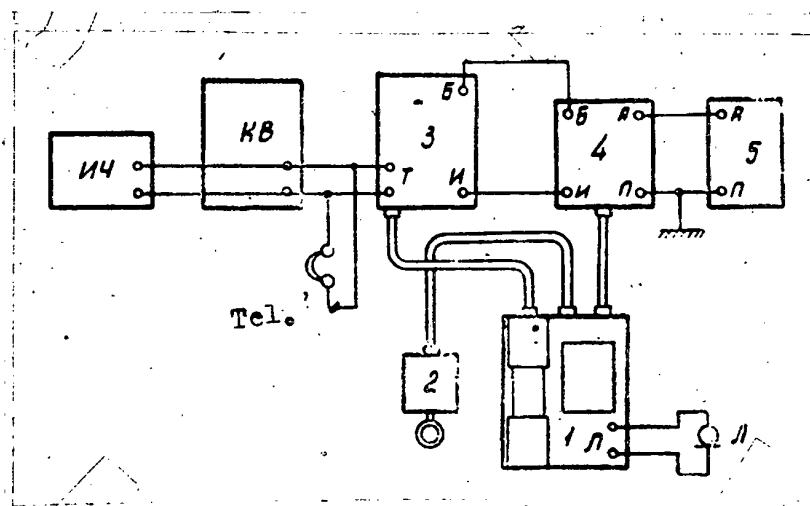


Figure 17: Block diagram of the circuit for checking the beat frequency signal amplitude of the transmitter and crystal calibrator.

1/Power unit, 2/Control box, 3/R.f. unit, 4/Antenna tuning unit, 5/Artificial antenna, KV/VKS-7 vacuum tube voltmeter, ICh/ICh-1 frequency meter.

SECRET
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S E C R E T
NO FOREIGN DISSEM

- 52 -

50X1

§ 8. Checking of side tone signal amplitude.

Checking of the side tone signal amplitude is carried out at the frequencies given in Table 18 with the aid of the circuit shown in Fig. 18. The checking procedure is carried out in the following order:

1. Connect a VKS-7 voltmeter to the socket "T" on the panel.
2. Tune the transmitter operating at 100% power output, RT transmission, to 2150 kc. .

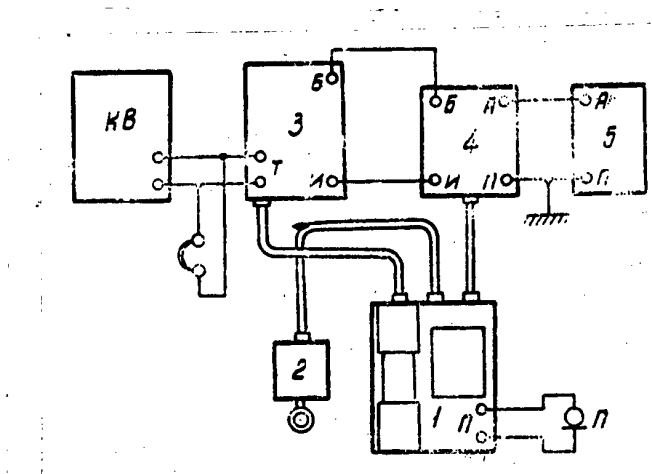


Figure 19: Block diagram of the circuit for checking the side tone signal amplitude.

1/Power unit, 2/Control box, 3/R.f. unit,
4/Antenna tuning unit, 5/Artificial antenna,
KV/VKS-7 vacuum tube voltmeter,

3. Set the antenna tuning unit switch to "OFF".
4. Check the noise amplitude of the transmitter. It should be within 2 - 3 V.
5. Apply a loud sound "A" to the throat microphone and check the side tone signal amplitude, using a VKS-7 voltmeter. The side tone signal amplitude under the given conditions should be within 20 - 30 V.

Check the side tone signal amplitude at the remaining fre-

S E C R E T
NO FOREIGN DISSEM
- 53 -

50X1

quencies given in Table 18, repeating the procedure outlined in 2 to 6.

T a b l e 18.

Side tone signal amplitude test frequencies.

Unit No.	Operation mode	Side tone signal amplitude test frequencies kc	
1	Amplification	2150	3600
	Frequency doubling	4300	7200

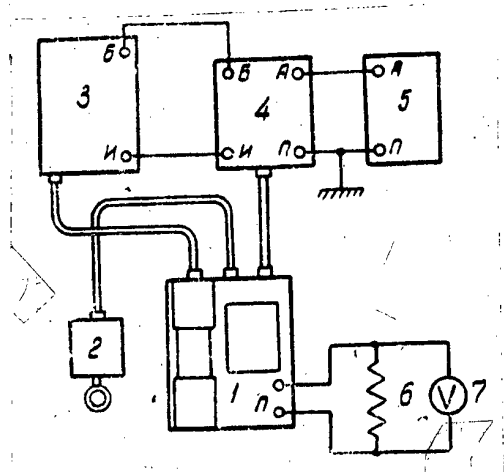


Figure 19: Block diagram of the circuit for checking the throat microphone supply.

1/Power unit, 2/Transmitter control box, 3/R.f. unit, 4/Antenna tuning unit, 5/Artificial antenna, 6/Equivalent resistance of the throat microphone, 7/Voltmeter.

§ 9. Checking of throat microphone supply voltage.

Checking of the throat microphone supply voltage is carried out with the aid of the circuit shown in Fig. 19.

Proceed in the following order:

1. Switch ON the transmitter and adjust its supply voltage to 26 V.
2. Check the throat microphone supply voltage value across an equivalent resistance equal to 150 ohms using a D.C.

S E C R E T

SECRET
NO FURTHER DISSEM

50X1

- 54 -

voltmeter. The throat microphone supply voltage should be within 5.5 - 5 V.

§ 10. Checking of modulator gain.

Checking of the modulator gain is carried out with the aid of the circuit shown in Fig. 19.

Proceed in the following order:

1. Switch ON the transmitter and tune it to 2870 kc.
2. Switch ON the audio signal generator.
3. Apply a 0.4 V 1000 cps signal from the audio signal generator through a 50 ohms resistor to the socket "L" of the power unit.
4. Check the A.C. voltage across the pin No. 36 of the terminal plate 204 and the chassis, setting successively the switch P 201 on the power unit to the positions "1", "2", and "3". This voltage should be within 82 - 98 V when switched to "1", within 55 - 65 V with the switch in position "2" and within 27 - 33 V with the switch in position "3".

SECRET
NO FURTHER DISSEM

NO FOREIGN DISSEM

- 55 -

50X1

Supplement 2.

Specification to the RSB-5 transmitter wiring diagram

Referen- ce sym- bol	Designation	Electrical data	Function
1	2	3	4
		R.f. unit	
C 101	Capacitor; variable; air-dielectric	15 mmF min. 65 mmF max.	Driver circuit capa- citor
C 102	Capacitor; variable air-dielectric	5 mmF max	Driver adjustment circuit
C 103	d t t o	2 mmF max.	Circuit correction capacitor
C 104	Capacitor; fixed ceramic-dielectric	2 mmF	Driver circuit ther- mal compensation
C 105	d t t o	40 mmF 6-20 Mc unit in the driver tube 50 mmF in all control grid circuit the remain- ing units	Coupling capacitor
C 106	d t t o	20 mmF	Driver circuit con- trol grid blocking capacitor
C 107	d t t o	30 mmF	Driver screen grid blocking capacitor when switched to crystal controlled operation
C 109	Capacitor; fixed mica-dielectric	3900 mmF $\pm$ 10% 500 V	Negative feedback coil blocking capa- citor; driver plate circuit
C 108	d t t o	3900 MMF $\pm$ 10% 500 V	Driver screen grid blocking capacitor; oscillation mode
C 110	d t t o	3900 mmF $\pm$ 10% 500 V	Driver suppressor grid blocking capacitor
C 111	Capacitor; fixed ceramic dielectric	30 mmF in the 6-20 Mc unit 50 mmF in all the remaining units	Coupling capacitor in the amplifier-fre- quency doubler control grid circuit
C 112	Capacitor; variable air-dielectric	15 mmF min. 120 mmF max.	Capacitor in the amplifier-frequency doubler circuit
C 113	Capacitor; variable air-dielectric	4 mmF max.	Adjustment of the ampli- fier-frequency doubler circuit

S E C R E T
NO FOREIGN DISSEM

50X1

1	2	3	4
C 114	Capacitor; fixed; mica-dielectric	3900 mmF $\pm$ 10% 500 V	Amplifier frequency doubler plate cir- cuit coil blocking capacitor
C 115	d t t o	3900 mmF $\pm$ 10% 500 V	Amplifier-frequency doubler suppressor grid blocking capa- citor
C 116	d t t o	150 mmF $\pm$ 10% 1000 V	Amplifier frequency doubler plate cir- cuit coupling capa- citor
C 117	Capacitor; fixed mica-dielectric	3900 mmF $\pm$ 10% 500 V	Amplifier-frequency doubler screen grid blocking capacitor
C 118	Capacitor; ceramic dielectric; fixed	30 mmF	Output stage tube control grid coupl- ing capacitor
C 119	Capacitor; fixed; mica dielectric	3900 mmF $\pm$ 10% 500 V	Output stage grid coil blocking capacitor
C 120	d t t o	1000 mmF $\pm$ 10% 1000 V	Output stage suppres- sor grid blocking ca- pacitor
C 121	d t t o	3900 mmF $\pm$ 10% 500 V	Output stage screen grid blocking capa- citor
C 122	Capacitor; fixed mica-dielectric	3900 mmF $\pm$ 10% 500 V	Output stage heater circuit blocking ca- pacitor
C 123	d t t o	3900 mmF $\pm$ 10% 500 V	Output stage heater filament blocking capacitor
C 124	d t t o	3300 mmF $\pm$ 10% 2000 V	Output stage plate circuit coil blocking capacitor
C 125	d t t o	3300 mmF $\pm$ 10% 2000 V	Output stage plate circuit coupling capa- citor
C 126	Capacitor; variable; air-dielectric	40 mmF min. 200 mmF max.	Output stage "coupling fine" capacitor
C 127	Capacitor; fixed ceramic-dielectric	2 x 67 mmF	Output stage "coupling fine" circuit capaci- tor,,connected when switched to the dial with larger graduations
C 128	d t t o	25 mmF in the 6-20 Mc unit 76 mmF in all the remaining units	Output stage "coupling coarse" circuit capa- citor

NO FOREIGN DISSEM

50X1

- 57 -

1	2	3	4
C 129	Capacitor; fixed ceramic-dielectric	67 mmF in the 3,6-12 Mc and 6-20 Mc units 3x67 mmF in the 2,15-7,2 Mc units	Output stage "coupling coarse" circuit capacitor
C 130	Capacitor; fixed mica-dielectric	510 mmF $\pm$ 10% 500 V	Indicator blocking capacitor
C 131	Capacitor; fixed; ceramic-dielectric	4 mmF	Rectifier coupling capacitor
C 132	Capacitor; fixed; mica-dielectric	3900 mmF $\pm$ 10% 500 V	Rectifier cathode blocking capacitor
C 134	d t t o	3900 mmF $\pm$ 10% 500 V	Terminal "I" blocking Capacitor
C 105	d t t o	3900 mmF $\pm$ 10% 500 V	Amplifier-frequency doubler cathode blocking capacitor
L 101	Inductor	75 microhenry in the 2,15 - 7,2 Mc unit 26 microhenry in the 3,6-12 Mc unit 9 microhenry in the 6-20 Mc unit	Driver circuit inductor
L 102	Inductor	60 ohms in the 2,15-7,2 Mc unit 30 ohms in the 3,6-12 Mc unit 15 ohms in the 6-20 Mc unit	Negative feedback inductor in the driver
L 103	d t t o	10 mikrohenry in the 2,15-7,2 Mc unit 4 microhenry in the 3,6-12 Mc unit 1,1 microhenry in the 6-20 Mc unit	Amplifier frequency doubler circuit inductor
L 104	d t t o	30 microhenry in the 2,15-7,2 Mc unit 12 microhenry in the 3,6-12 Mc unit 3,3 microhenry in the 6-20 Mc unit	Amplifier-frequency doubler circuit inductor
L 105	R.f. choke	5 microhenry in the 2,15-7,2 and 3,6-12 Mc units 100 microhenry in the 6-20 Mc unit	Amplifier-frequency doubler plate circuit choke

SECRET

NO FOREIGN DISSEM

S E C R E T
NO FORN DISSEM

50X1

58

1	2	3	4
L 106	R.f. choke	100 microhenry in the 6-20 Mc unit 5 microhenry in the 2,15-7,2 and 3,6-12 Mc units	Output stage control grid circuit choke
L 107	d t t o	5 microhenry in the 2,15-7,2 and 3,6-12 Mc units	Output stage suppressor grid choke
L 108	d t t o	0,16 microhenry in the 2,15-7,2 and 3,6-12 Mc unit 75 microhenry in the 6-20 Mc unit	Output stage plate circuit choke
L 109	R.f. coil with core	70 microhenry in the 2,15-7,2 Mc unit 50 microhenry in the 3,6-12 Mc unit 20 microhenry in the 6-20 Mc unit	Output stage circuit adjustment / antenna adjustment/
R 101	Resistor; enamelled	10000 ohms $\pm$ 10% 20 W	Driver plate circuit voltage dropping resistor
R 102	Resistor /ceramic/	100000 ohms $\pm$ 10% 1 W	Voltage driver in the driver screen grid circuit
R 103	d t t o	33000 ohms $\pm$ 10% 1 W	d t t o
R 104	d t t o	100000 ohms $\pm$ 10% 1 W	Driver control grid leak
R 105	d t t o	100000 ohms $\pm$ 10% 0,25 W	Driver suppressor grid leak
R 106	d t t o	100000 ohms $\pm$ 10% 0,25 W	Amplifier-frequency doubler control grid leak
R 107	Resistor; enamelled	20000 ohms $\pm$ 10% 20 W	Amplifier-frequency doubler screen grid voltage dropping resistor
R 108	d t t o	20 ohms $\pm$ 10% 8 W	Voltage dropping resistor in the G-411 and 6SA7 heater circuit
R 109	Resistor; ceramic	470000 ohms $\pm$ 10% 0,25 W	Resistor in cathodes of the driver and amplifier frequency doubler vacuum tubes

S E C R E T
NO FORN DISSEM

SECRET
NO FOREIGN DISSEM

- 59 -

50X1

1	2	3	4
R 110	Resistor; enamelled	1000 ohms $\pm$ 10% 8 W	Voltage dropping resistor in the output amplifier screen grid
R 111	Resistor; wire wound	143 $\pm$ 3 ohms	Driver plate circuit indicator shunt
R 112	d t t o	45 $\pm$ 1 ohm	Amplifier-frequency doubler plate circuit indicator shunt
R 113	d t t o	45 $\pm$ 1 ohm	Output stage screen grid indicator circuit shunt
R 114	d t t o	134 $\pm$ 3 ohms	G471 vacuum tube control grid circuit indicator shunt
R 115	Resistor; ceramic	33000 ohms $\pm$ 10% 1 W	Indicator rectifier plate resistor
R 116	d t t o	220 ohms $\pm$ 10% 8 W	Cathode resistor of the amplifier-frequency doubler
G 101	Receptacle	-	Supply receptacle of the R.f. unit
G 102	d t t o	-	Supply receptacle of the R.f. unit pedestal
G 103	Connector	-	For connecting cables from the power unit to the R.f. unit pedestal
G 104	Terminal, "B"	-	Terminal for connecting the antenna to the R.f. unit
G 105	Receptacle	-	Receptacle of the pedestal for connecting headphones
G 106	Terminal "I"	-	Terminal for connecting the lead passing from terminal "I" of the antenna tuning unit
I 101	Indicator	-	Indicator for checking regular operation of the individual R.f. units
L 101	Vacuum tube	G 411	Driver vacuum tube
L 102	d t t o	G 411	Amplifier-frequency doubler vacuum tube
L 103	d t t o	G 471	Output stage vacuum tube
L 104	d t t o	6SA7	Indicator rectifier vacuum tube

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60			
1	2	3	4
P 101	Receptacle	-	For connecting the crystal to the screen and control grid of the driver vacuum tube
P 102	Switch	-	Switching R.f. unit to its front adjustment panel
P 103	dtto	-	For switching the amplifier-frequency doubler from one operation mode to the other
P 104	dtto	-	For switching of the auxiliary capacitor to the "coupling-fine" capacitor of the output stage
P 105	dtto	-	Switching of "coupling coarse" capacitor of the output stage.
P 106	dtto	-	Switching of the output circuit from series to parallel connection and vice versa
P 107	dtto	-	Switching of the R.f. indicator circuits
E 101	Relay	-	R.f. unit cut-in relay
E 102	dtto	-	Relay connecting the antenna to the R.f. unit
E 103	dtto	-	Relay of the series parallel circuit
Power unit.			
C 201	Capacitor; electrolytic	10 mF $\pm$ 20% 450 V	+350 V circuit blocking capacitor
C 202	Capacitor; fixed; paper	2 mF $\pm$ 20% 1000 V	+1000 V circuit blocking capacitor
C 203	Capacitor; fixed; paper	0,05 mF $\pm$ 20% 400 V	De-coupling capacitor in the first speech amplifier stage plate circuit
C 204	Capacitor; fixed; mica-dielectric	3900mmF $\pm$ 10% 500 V	Input circuit blocking capacitor
C 205	dtto	1800mmF $\pm$ 10% 1000 V	Coupling capacitor in the first speech amplifier stage control grid
C 206	dtto	3900mmF $\pm$ 10% 500 V	Coupling capacitor in the grid circuit of the 2nd speech amplifier stage

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- 61 -

50X1

1	2	3	4
		Power unit	
C 207	Capacitor; fixed; mica-dielectric	25000 mmF $\pm$ 10% 1000 V	Coupling capacitor in the suppressor grid circuit of the output stage
C 208	Capacitor; fixed paper	0,5 mF $\pm$ 20% 260 V	Blocking capacitor of the mixer potentiometer circuit
C 209	Capacitor; fixed mica-dielectric	1000 mmF $\pm$ 10% 1000 V	Audio signal generator circuit capacitor
C 210	Capacitor; fixed electrolytic	10 mF $\pm$ 20% 450 V	Rectifier filter capacitor
C 211	Capacitor; fixed paper	0,5 mF $\pm$ 20% 260 V	Plate circuit capacitor of the side tone amplifier
C 213	Capacitor; fixed; mica-dielectric	3900 mmF $\pm$ 10% 500 V	Coupling capacitor in the indicator circuit
C 215	Capacitor; fixed; paper	0,5 mF $\pm$ 20% 260 V	Blocking capacitor of the $\pm$ 80 V circuit
C 216	d t t o	0,25 mF $\pm$ 20% 260 V	Blocking capacitor of the $\pm$ 26 V commutator circuit
L 201	R.f. choke	3 henry	Throat microphone supply circuit choke
L 202	d t t o	0,3 henry	Throat microphone load choke
L 203	d t t o	0,8 henry	Input circuit choke
L 204	d t t o	13 henry	Choke in the plate circuit of the 2nd speech amplifier stage
L 205	d t t o	3 henry	Indicator circuit choke
R 201	Resistor; wire wound	0,25 ohms	Step-start resistor
R 202	Resistor; ceramic	220000 ohms $\pm$ 10% 0,25 W	Input sensitivity adjustment resistor
R 203	d t t o	150000 ohms $\pm$ 10% 0,25 W	d t t o
R 204	d t t o	47000 ohms $\pm$ 10% 0,25 W	Input sensitivity adjustment resistor
R 205	d t t o	100000 ohms $\pm$ 10% 0,25 W	d t t o
R 206	d t t o	1,8 megohms $\pm$ 10%	Decoupling resistor of the 1st speech amplifier stage
R 207	d t t o	2400 ohm $\pm$ 5% 0,25 W	Speech amplifier input circuit resistor
R 208	d t t o	100000 ohms $\pm$ 10%	1st speech amplifier stage grid leak

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62

50X1

1	2	3	4
R 209	Resistor ceramic	1,8 megohm $\pm 10\%$	2nd speech amplifier stage grid leak
R 210	d t t o	470000 ohms $\pm 10\%$ 0,25 W	Negative grid bias resistor of the speech amplifier
R 211	d t t o	470000 ohms $\pm 10\%$ 0,25 W	d t t o
R 212	d t t o	10000 ohms $\pm 10\%$	d t t o
R 213	d t t o	15000 ohms $\pm 10\%$ 0,25 W	d t t o
R 214	d t t o	820 ohms $\pm 10\%$ 0,25 W	Audio signal generator grid leak
R 215	d t t o	50000 ohms $\pm 10\%$ /2x100000 ohms/	Negative grid bias resistor
R 216	Resistor wire wound	3500 ohms $\pm 10\%$ 8 W	Negative grid bias and grid leak resistor of G 471 vacuum tube
R 217	Resistor; ceramic	68000 ohms $\pm 10\%$	Suppressor grid circuit resistor of the G 411 vacuum tube
R 218	d t t o	68000 ohms $\pm 10\%$ 1 W	d t t o
R 219	d t t o	100000 ohms $\pm 10\%$ 0,25 W	G471 suppressor grid voltage divider
R 220	d t t o	100000 ohms $\pm 10\%$ 0,25 W	d t t o
R 221	d t t o	150000 ohms $\pm 10\%$ 0,25 W	d t t o
R 223	d t t o	68000 ohms $\pm 10\%$ 1W	L.f.amplifier plate circuit resistor /side tone amplifier/
R 224	d t t o	68000 ohms $\pm 10\%$ 1 W	d t t o
R 225	d t t o	100000 ohms $\pm 10\%$ 1 W	d t t o
R 226	Resistor; enamelled	5 ohms $\pm 10\%$ 8 W	Voltage dropping resistor in the G 471 vacuum tube heater circuit
R 227	d t t o	35 ohms $\pm 10\%$ 8 W	Resistor in the throat microphone supply circuit
R 228	d t t o	9 ohms $\pm 10\%$ 8 W	Voltage dropping resistor in the 6NZ vacuum tube heater circuit
R 229	d t t o	3500 ohms $\pm 10\%$ 8 W	G 471 vacuum tube suppressor grid circuit voltage divider resistor

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1	2	3	4	50X1
R 230	Resistor; enamelled	10000ohms $\pm 10\%$ 20W	G 471	vacuum tube suppressor grid circuit voltage divider resistor
R 231	Resistor; wire wound	3,98 ohms		Shunt in the total current indicator circuit
V 201	Fuse	1 A		Fuse in the 350 V circuit
V 202	dtto	1 A		Fuse in the 1000 V circ.
V 203	dtto	10A		Fuse +26 V circuit of the receiver
V 204	dtto	10 A		Fuse in the + 26V circuit of the transmitter
G 201	Receptacle "L"	-		Throat microphone connection
G 202	Connector	-		Connection of the power unit cable to the aircraft electrical system
G 203	d t t o	-		Connector of the power unit and receiver connecting cable
G 204	d t t o	-		Connection of the power unit and No.3 R.f. unit connecting cable
G 205	d t t o	-		Connection of the power unit and Nos.1 and 2 r.f. unit connecting cable
G 206	d t t o	-		Connection of the power unit and control panel connecting cable
G 207	d t t o	-		Connection of the power unit and antenna tuning unit connecting cable
G 208	Terminal "P"	-		Terminal of antenna balance
G 209	Terminal "S" /side tone/	-		Connection of the radio operator's headset leads and the interphone jack box
L 201	Vacuum tube	6N7		Speech amplifier
L 202	d t t o	6N7		Audio signal generator and rectifier
P 201	Switch "1-2-3"			Sensitivity control of the speech amplifier input circuit
P 202	Switch			Switch of the "Reception-transmission" relay when operating with the BP-1 /DVB-5/unit

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50X1

1	2	3	4
P 203	Switch		External modulation switch
T 201	Transformer		Audio signal generator transformer
E 201	Relay		Stepstarting relay
E 202	dtto		Starting relay
E 203	dtto		"Reception-transmission" relay
<u>Antenna tuning unit</u>			
C 301	Capacitor; fixed mica-dielectric	82 mmF $\pm 10\%$ 500 V	Crystal oscillator control drig blocking capacitor
C 302	Capacitor; variable ceramic-dielectric	8-15 mmF	Crystal frequency correction trimmer
C 303	Capacitor; fixed; mica-dielectric	91 mmF $\pm 5\%$ 500 V	Crystal oscillator screen grid blocking capacitor
C 304	d t t o	1800 mmF $\pm 10\%$ 500 V	Mixer plate blocking capacitor
C 305	d t t o	33 mmF $\pm 10\%$ 500 V	Blocking capacitor of the mixer 3rd grid
C 306	d t t o	33 mmF $\pm 10\%$ 500 V	Coupling capacitor of the 200 kc oscillator grid circuit
C 307	d t t o	91 mmF $\pm 5\%$ 500 V	Capacitor in the 200 kc oscillator circuit
C 308	d t t o	510 mmF $\pm 10\%$ 500 V	Coupling capacitor of the 200 kc oscillator grid circuit
C 309	d t t o	33 mmF $\pm 10\%$ 500 V	Coupling capacitor of the 40kc oscillator grid circuit
C 310	d t t o	10 mmF $\pm 10\%$ 500 V	Coupling capacitor in the mixer grid circuit
C 311	d t t o	510 mmF $\pm 5\%$ 500 V	Capacitor in the 40 kc oscillator circuit
C 312	d t t o	510 mmF $\pm 5\%$ 500 V	Coupling capacitor in the 40 kc oscillator grid circuit
C 313	d t t o	10 mmF $\pm 10\%$ 500 V	Coupling capacitor in the 10-20 kc oscillator grid circuit
C 314	d t t o	10 mmF $\pm 10\%$ 500 V	Coupling capacitor in the mixer grid circuit
C 315	d t t o	2400 mmF $\pm 5\%$ 500 V	Capacitor in the 10kc oscillator circuit

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1	2	3	4
C 316	Capacitor; fixed mica-dielectric	2000 mmF $\pm$ 5% 500 V	Capacitor in the 20kc oscillator circuit
C 317	d t t o	510 mmF $\pm$ 10% 500 V	Coupling capacitor in the 10-20 kc oscillator grid circuit
C 318	d t t o	510 mmF $\pm$ 10% 500 V	10-20 kc oscillator capacitor
C 319	d t t o	33 mmF $\pm$ 10% 500 V	Mixer grid coupling capacitor
C 320	d t t o	3900 mmF $\pm$ 10% 500 V	Coupling capacitor connected between the mixer plate and l.f. amplifier control grid
C 321	d t t o	3900 mmF $\pm$ 10% 500 V	Coupling capacitor connected between the plate of the 1st l.f. amplifier stage and grid of the 2nd l.f. amplifier stage.
C 322	d t t o	510 mmF $\pm$ 10% 500 V	1st l.f. amplifier stage grid circuit blocking capacitor
C 323	d t t o	3900 mmF $\pm$ 10% 500 V	Side tone correction capacitor
C 324	d t t o	510 mmF $\pm$ 10% 500 V	Coupling capacitor connected between the audio signal generator and the indicator grid
C 325	d t t o	3900 mmF $\pm$ 10% 500 V	#80 V circuit blocking capacitor
C 326	d t t o	10 mmF $\pm$ 10% 500 V	Coupling capacitor of the mixer grid circuit
C 327	d t t o	10 mmF $\pm$ 10% 500 V	Capacitor connected between the 3rd and screen grid of the 200 kc oscillator
C 328	d t t o	82 mmF $\pm$ 10% 500 V	Capacitor connected between the 3rd and screen grid of 40kc oscillator
C 329	d t t o	510 mmF $\pm$ 10% 500 V	Blocking capacitor of the 2nd l.f. amplifier stage control grid circuit
C 330	d t t o	3900 mmF $\pm$ 10% 500 V	Terminal "I" blocking capacitor
L 301	Inductor; variable inductance	7 microhenry	Inductor of the 200 kc oscillator tuned circuit
L 302	d t t o	32 microhenry	Inductor of the 40kc oscillator tuned circuit

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1	2	3	4	50X1
L 303	Inductor; variable inductance	32 microhenry	Inductor of the 10 kc oscillator tuned circuit	
L 304	d t t o	32 microhenry	Inductor of the 20 kc oscillator tuned circuit	
R 301	Resistor; ceramic	100000 ohms ± 10%, 0,25 W	Voltage dropping resistor in the mixer plate circuit	
R 302	d t t o	470000 ohms ± 10%, 0,25 W	d t t o	
R 303	d t t o	68000 ohms ± 10%, 1 W	Voltage dropping resistor in the screen grid circuit of the crystal oscillator	
R 304	d t t o	68000 ohms ± 10%, 1W	Voltage dropping resistor in the screen grid circuit of the crystal oscillator	
R 305	d t t o	1,8 megohms ± 10%, 0,25 W	Mixer 3rd grid leak	
R 306	d t t o	47000 ohms ± 10%, 0,25 W	Voltage dropping resistor in the 200 kc oscillator plate circuit	
R 307	d t t o	47000 ohms ± 10%, 0,25 W	Control grid leak of the 200 kc oscillator	
R 308	d t t o	100000 ohms ± 10%, 0,25 W	3rd grid leak of the 200 kc oscillator	
R 309	d t t o	220000 ohms ± 10%, 0,25 W	Voltage dropping resistor in the 40 kc oscillator plate circuit.	
R 310	d t t o	47000 ohms ± 10%, 0,25 W	Grid leak of the 40 kc oscillator control grid	
R 311	d t t o	150000 ohms ± 10%, 0,25 W	3rd grid leak of the 40kc oscillator	
R 312	d t t o	470000 ohms ± 10%, 0,25 W	De-coupling resistor of the 40 kc oscillator	
R 313	d t t o	22000 ohms ± 10%, 0,25 W	Voltage dropping resistor in the 10-20 kc oscillator plate circuit.	
R 314	d t t o	150000 ohms ± 10%, 0,25 W	Grid leak of the 10-20kc oscillator control grid	
R 315	d t t o	100000 ohms ± 10%, 0,25 W	Grid leak of the 3rd grid of the 10-20 kc oscillator	
R 316	d t t o	470000 ohms ± 10%, 0,25 W	De-coupling resistor of the 10-20 kc oscillator	
R 317	d t t o	470000 ohms ± 10%, 0,25 W	10-20-40 kc filter resistor	

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50X1

1	2	3	4
R 318	Resistor; ceramic	1,8 megohms $\pm 10\%$, 0,25W	1st l.f. amplifier stage grid leak
R 319	d t t o	470000 ohms $\pm 10\%$, 0,25W	2nd l.f. amplifier stage grid leak
R 320	d t t o	470000 ohms $\pm 10\%$, 0,25W	1st l.f. amplifier stage plate resistor,
R 321	d t t o	33000 ohms $\pm 10\%$, 0,25 W	Crystal oscillator grid leak
R 322	d t t o	470000 ohms $\pm 10\%$, 0,25 W	De-coupling resistor of the indicator grid
R 323	d t t o	220000 ohms $\pm 10\%$, 0,5 W	Resistor in the crystal calibrator screen grid when switched to "KOR".
R 324	d t t o	2400 ohms $\pm 5\%$ 0,25 W	Resistor in the indica- tor circuit
R 325	Resistor; enamelled	5000 ohms $\pm 10\%$, 8W	Voltage divider resistor in the +80 V circuit
R 326	Resistor; ceramic	22000 ohms - $\pm 10\%$, 0,25W	Resistor in the indicator circuit
G 301	Receptacle "AI"		Indicator connection
G 302	Connector		Connection of the power unit and antenna tuning unit connection cable
G 303	Terminal "A"		Connection of the air- craft antenna
G 304	Terminal "Ap"		Connection of the recei- ver antenna
G 305	Terminal "B"		Connection of the r.f. unit antenna lead
G 306	Terminal "C" /coupling/		Connection of the mixer grid lead for increasing coupling,
G 307	Terminal "P"		Balance connection
G 308	Terminal "I"		Connection of the indica- tor lead passing from ter- minal "I" on the pedestal
I 301	Indicator	Current range 1 mA	Antenna tuning indicator
L 301	Vacuum tube	6SA7	Crystal oscillator and mixer
L 302	d t t o	6SA7	200 kc oscillator
L 303	d t t o	6SA7	40 kc oscillator
L 305	d t t o	6N7	L.f. amplifier and side tone
P 301	Switch		10-20 kc tuned circuit switch

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50X1

1	2	3	4
P 302	Switch		Mixer control grid switch
P 303	dtto		Switch in the +80V circuit
P 304	dtto		Switch in the + 350 V circuit
X 301	Crystal	1000 kc	
E 301	Relay		Antenna switching relay
E 302	dtto		Receiver input cut-out relay
<u>Control panel</u>			
C 401	Capacitor; fixed paper	0,5 mF $\pm$ 20% 260 V	CW operation at 25% power output capacitor
C 402	Capacitor; fixed paper-oil	0,025 mF $\pm$ 20% 400 V	Capacitor for decreasing modulation depth at 25% power output
R 401	Resistor; ceramic	200000 ohms $\pm$ 5%, 0,25W	Mixer resistor when operating in RT
R 402	d t t o	220000 ohms $\pm$ 10%, 0,25W	Resistor for CW operation at 25% power output
R 403	d t t o	22000 ohms $\pm$ 10%, 0,25W	Resistor for decreasing modulation depth at 25% power output
G 401	Connector		Connection of the control panel and power unit connecting cable
P 401	Switch		"Reception-transmission" switch
P 402	dtto		"Voice-tone" switch
P 403	dtto		"25%-100%" power output switch
P 404	Switch "1-2-3"		Band switch
P 405	Key		
P 406	Switching contact		Key switching contact
P 407	d t t o		d t t o

Note: Items marked with asterisks can be replaced in the course of adjustment of the transmitter in the factory.

S E C R E T
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- 69

S E C R E T
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Supplement 3. 50X1

..... Technical requirements for a repaired transmitter

Item No.	Checked parameter	Parameter value	Note
1	2	3	4
1	Resistance to vibration		/See chapter 6, § 1/.
2	External appearance and assy		/See chapter 3, § 1/.
3	Function and current drawn by the low tension circuits	Tuning indicator, pointer should swing to 5-6 graduations with transmitter switched to CW operation 2, The current drawn by low tension circuits should not exceed 31 A.	
4	Power output dissipated in the artificial antenna 1/CW operation at 100% power output: 2150 kc 12000 kc	50 W min. 90 W min.	Power output should increase with increasing frequency within the band
	2/100% power output RT operation	Not less than 20% of the rated CW operation power output	
	3/25% power output RT operation	Not less than 20% of the rated RT operation power output	
	4/25% power output CW operation	Not less than 20% of the rated CW operation power output	
5	Calibration error	0,02% when tuning with the aid of the crystal calibrator * 0,09% when tuning without the aid of the crystal calibrator	
6	Transmitter modulation depth	90 - 100%	
7	Beat frequency signal amplitude of the transmitter and X-tal calibrator at 800+ 100 cps	15 V min.	

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50X1

Item No.	Checked parameter	Parameter value	N o t e
1	2	3	4
8	Side tone signal amplitude checked at the limit frequencies of the transmitter band	20 - 30 V	With a loud sound "A" applied to the throat microphone and noise level less than 2-3 V
9	Throat microphone supply voltage	3,5 - 5 V	Checked across an equivalent load of 150 ohms
10	Speech amplifier gain control		When switched to "1" and "3" the output voltage of the speech amplifier should increase and decrease to 40-60% respectively as compared to the output voltage obtained in position "2" of the switch.

* A calibration error of 0,12% is tolerated at 15% of all the r.f. unit dial graduations.

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Supplement 4. 50X1

Transmitter choke and relay winding parameters.

Item No.	Title	Wiring diagr. Ref.No	Wire type	Wire dia. mm	No of turns	Winding resis- tance ohms	Induc- tance henry	Insu- lati- on re- sist. megohm	Note
1	2	3	4	5	6	7	8	9	10
1	L.f. choke in the indicator grid circuit	L 205	PEL-1	0,18	3500	110-150	3 henry	100	
2	L.f. choke in the throat microphone supply circuit	L 201	PEL-1	0,18	3500	110-150	3 henry	100	
3	L.f. choke in the 2nd speech amplifier stage plate circuit	L 204	PEShO	0,1	3200	550-800	13 henry	100	
4	R.f. choke in the L102 vacuum tube plate circ.	L 105	PEShO	0,2	1000	75-115	4,5-7 micro-henry	100	
5	R.f. choke in the L103 vacuum tube control grid circuit	L 106	PEShO	0,2	1000	75-115	4,5-7 micro-henry	100	2,15-7,2 and 3,6-12 mc units
6	R.f. choke in the L103 vacuum tube suppressor grid circuit	L 107	PEShO	0,2	1000	75-115	4,5-7 micro-henry	100	2,15-7,2 and 3,6-12mc units
7	R.f. choke in the L103 vacuum tube plate circ.	L 108	PEShO	0,2	110	5,6-6,6	0,18 micro-henry	100	2,15 - 7,2 and 3,6-12mc units
8	Starting relay	E202	PEL-1	0,5	1025	6-6,8			
9	Step-starting relay	E201	PEL-1	0,27	3470	76			
10	"Reception-transmission" relay	E203	PEL-1	0,38	800	6			
11	Series to parallel connection switching relay	E103	PEL-1	0,15	2800	100-150			
12	R.f. unit connecting relay	E102	PEL-1	0,15	2800	100-150			
13	R.f. unit cut-in relay	E101	PEL-1	0,12	2500	135-165			

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S E C R E T
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- 73 -

50X1

Supplement 6.

Tool for adjustment of transmitter calibration.

A tool, a view of which is shown in fig.21, is used in the course of calibration of the master oscillator as well as in course of aligning the buffer stage with the master oscillator.

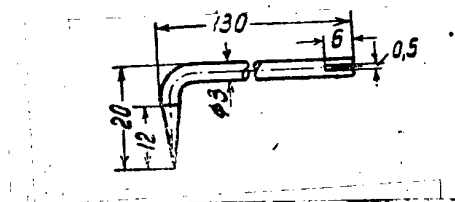


Figure 21: Tool for transmitter calibration adjustment.

The pointed section of the tool is used for turning the trimmer rotors of the master oscillator and buffer stage tuned circuits. The section with a 0,5 mm groove is used for bending the outer plates of the C 101 and C 102 variable capacitors.

Supplement 7.

Equivalent load of the power unit.

An equivalent load of the power unit should be made and used in the course locating defects of the RSB-5 transmitter /see fig.22/. The following components are required for equivalent load assembly:

1. Resistor $R = 6,6$ ohms, 59,4 W
2. Resistor $R = 5000$ ohms, 200 W and a resistor $R = 3600$ ohms, 36 W.

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50X1

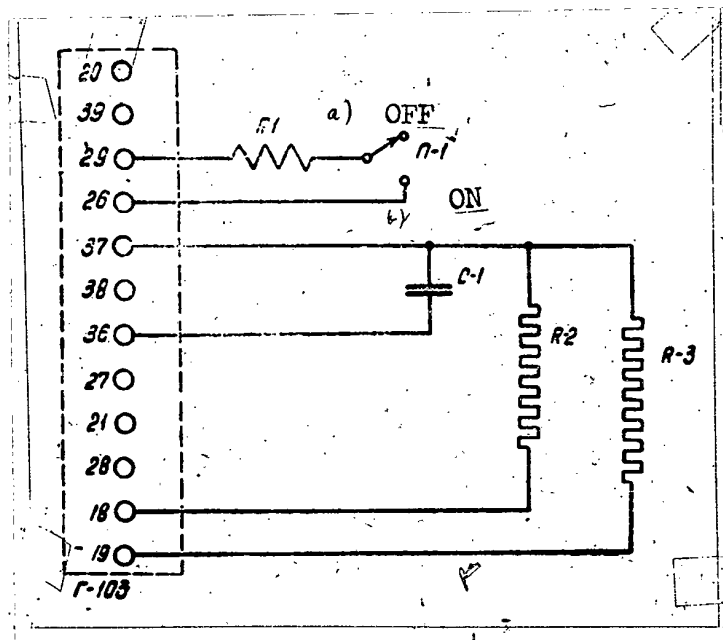


Figure 22: Wiring diagram of the power unit equivalent load.

R1/Wire wound resistor, 6,6 ohms, P1/Switch, C1/Capacitor 200 mmF 250 V, R2/Enamelled resistor 3500 ohms 36 W, R3/Enamelled resistor 5000 ohms 200 W.

The components should be assembled on a metal chassis 25 x 25 mm or on a wooden chassis of the same dimensions. Cover the chassis with thermal insulation in the latter case.

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Supplement 8.

50X1

Set of spare parts supplied by the factory for
overhauling the transmitter.

Item No.	Title	No. reg.	Drawing No.	Reference symbol
1	2	3	4	5
1	Connecting wire 3mm dia 3 m	3	8680	501
2	Copper wire, tin plated 2mm dia	10m	43-43-60	-
3	Wire 0,8 mm dia	30m	117-23-60	-
4	Bare copper wire 1,5 mm dia	10m	113-49-15	-
5	Capacitor; electrolytic 10 mF, 450 V	5		C 210 C 201
6	Capacitor KBG-MN1 2 mF, 1000 V	5		C 202 C 203
7	Capacitor KBG-M2 0,05 mF, 400 V	10		C 402
8	R.f. choke	5	8643	L 108 L 106
9	R.f. choke	10	5357	L 105 L 107
10	Tuned circuit 200 kc	2	8784-501	L 301
11	Tuned circuit 40 kc	6	8784-502	L 302, L 303, L 304
12	Indicator M-61	5		I 101
13	Indicator M-52	5	8918-501	I 301
14	Choke	5	8293-502	L 204
15	Transformer	5	8793-501	T 201
16	2 choke assy.	5	8789	L 202
17	Variometer	3	8666-501 8666-502	L 109 X 301
18	Crystal 1000 kc	2		
19	Fuse box	2	8977-501	
20	G471 vacuum tube socket	5	5354	
21	G 471 vacuum tube socket	5	8730-501	
22	6N7 vacuum tube socket	2	5418	
23	Terminal "I"	5	20280-501	G 106, G 308
24	L.f. choke	5	8893-501 8893-502	201 205
25	Switch	1	8988-501	P 102
26	Resistor; enamelled 1000 ohms, 10 W	5	147-62-10	R 110
27	Resistor; enamelled 20000 ohms, 25 W	5	14767-63	R 107
28	Resistor; enamelled 20 ohms, 10 W	5	14762-50	R 108
29	Resistor; enamelled 25 ohms, 25 W	5	14763-34	R 101

- 76 -

50X1

1	2	3	4	5
30	Resistor; enamelled 350 ohms, 10 W	5	14762-11	R 215
31	Resistor; enamelled 9 ohms, 10W	5	14762-24	R 228
32	Resistor; enamelled 5000 ohms, 25 W	3	147-67-30	R 230
33	Resistor; enamelled 50 ohms, 10 W	5	14762-33	R 226
34	Resistor; wire-wound 0,25 ohm	2	14758-33	R 201 R 207
35	Resistor; ceramic 24000 ohms, 0,25 W	5	-	R 324
36	Resistor; ceramic 10000 ohms, 0,25 W	5	-	R 105 R 102
37	Resistor; ceramic 15000 ohms, 0,25 W	5	-	R 213
38	Resistor; ceramic 33000 ohms, 0,25 W	5	-	R 321
39	Resistor; ceramic 33000 ohms, 1 W	5	-	R 115 R 307
40	Resistor; ceramic 47000 ohms, 0,25 W	5	-	R 309
40	Resistor; ceramic 47000 ohms, 0,25 W	5	-	R 307, R 309, R 310, R 313, R 314, R 103
41	Resistor; ceramic 6800 ohms, 1 W	5	-	R 115
42	Resistor; ceramic 100000 ohms, 0,25 W	5	-	R 205, R 219 R 208, R 220 R 221, R 301
43	Resistor; ceramic 800 ohms, 0,25 W	5	-	R 217
44	Resistor; ceramic 22000 ohms, 0,25 W	5	-	R 326
45	Resistor; ceramic 100000 ohms, 1 W	5	-	R 102, R 104, R 215, R 225
46	Resistor; ceramic 150000 ohms, 0,25 W	5	-	R 202 R 314, R 203
47	Resistor; ceramic 200000 ohms, 0,25 W	5	-	R 401 R 402
48	Resistor; ceramic 470000 ohms, 0,25 W	5	-	R 302, R 322, R 109, R 210, R 317, R 319, R 211, R 302, R 311, R 312, R 315, R 316 R 318, R 305, R 206, R 209,
49	Resistor; ceramic 1800000 ohms, 0,25 W	5	-	
50	Variometer roller springs	10	8984-501	
51	Variometer shaft	2	8698-1	
52	Roller	5	8698-2	
53	Capacitor; type MKV 0,5 mF, 260 V	5	-	C 208, C 211, C 215, C 401
54	Lining	2	8732-501	

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- 77 -					50X1	
1	2	3	4	5		
55	Spring	5	8797-501			
56	Variometer vernier	1	8797-501			
57	Lining	1	8666-1			
58	G 411 vacuum tube					
	plate lead	10	8709-501			
59	G 471 vacuum tube					
	plate lead	5				
60	Rubber shock mounts	20				
61	Terminal bar	2	8699-501			
62	Friction gear shaft	5	8936-15			
63	Friction plate	5	8936-17			
64	Friction washer	5	8936-16			
65	Wing wash washer	5	169-01-01			
66	Variable capacitor	1	8948-501			
67	Bonding strap	10	8661-501			
		10	8661-502			
		10	8661-503			
68	Screw	30	161-37-01			
69	Nut	30	165-02-09			
70	Screw	15	161-60-10			
71	Screw	30	161-33-21			
72	Washer	30	161-33-21			
73	Panel key	3	8722-501			
74	Key base	3	8668-501			
75	Artificial antenna	1				
76	Aircraft electrical					
	system cable	1	8966			
77	Cable connecting the					
	power unit to the r.f.					
	unit	1	8778			
78	Cable connecting the po-					
	wer unit to the antenna					
	tuning unit	1	8780			
79	Cable connecting	1	8778			
80	Intermediate receiver					
	cable	1	9056			
81	Cable connecting the po-					
	wer unit to the receiver	1	8934			
82	Antenna switching relay	10	8994		E 102, E 103,	
					E 301	
83	Starting relay	5	203449-502		E 202	
84	Step-starting relay	5	20349-501		E 201	
85	"Reception-transmission"					
	relay	5	20287-502		E 203	
86	Relay	12	8690		E 101, E 302	
87	5 throw switch	5	8771-501		P 107	
88	3 throw switch	6	8650-501		P 204	
89	Switch	5	8569, 502		P 105	
90	Receptacle; 11 contact					
	pins	4	8687-501		G 101	
91	Receptacle; 11 sockets	4	6660-501			
92	Receptacle; 8 contact pins	5	8724-501		G 302, G 202,	
					G 205, G 207	
93	Receptacle; 8 sockets	5	8937-501		G 203	
94	Receptacle; 12 cont. pins	5	2814-1		G 103	
95	Receptacle; 12 sockets	5	8735-501		G 204	
96	Antenna insulator	10	8991-501		G 204	

Supplement^{50X1} 1.Transmitter wiring diagram.

1/Power unit, 2/R.f.unit, 3/To unit No.3, 4/Suppr.grd.
 G-411, 5/Suppr.grd. G-471, 6/Control grd.G-471, 7/Comm.,
 8/RUK 300B start, 9/Wave No.3, 10/Phones, 11/Suppr.grd.
 G-411, 12/Suppr.grd-G-471, 13/C.Grd G-471, 14/Comm.,
 15/Wave No.1, 16/RUK300B start, 17/Wave No.2, 18/Phones,
 19/Suppr.grd. G-411, 20/Suppr.grd.G-471, 21/Oprn.mode,
 22/Wave No.3, 23/Wave No.2, 24/Wave No.1, 25/Side tone,
 26/Relay, 27/Oprn.mode, 28/Comm., 29/Heater, 30/Aircraft
 el.system, 31/To the receiver, 32/Side tone, 33/To the an-
 tenna tuning unit, 34/To the control box, 35/To No.1 unit,
 36/To No.2 unit, 37/Control box, 38/Antenna tuning unit,
 39/OFF, 40/COR.

Supplement 9.

Low tension circuit wiring diagram.

1/R.f. unit, 2/Power unit, 3/Control box, 4/Aircraft el.
 system, 5/Receiver, 6/Antenna tuning unit,

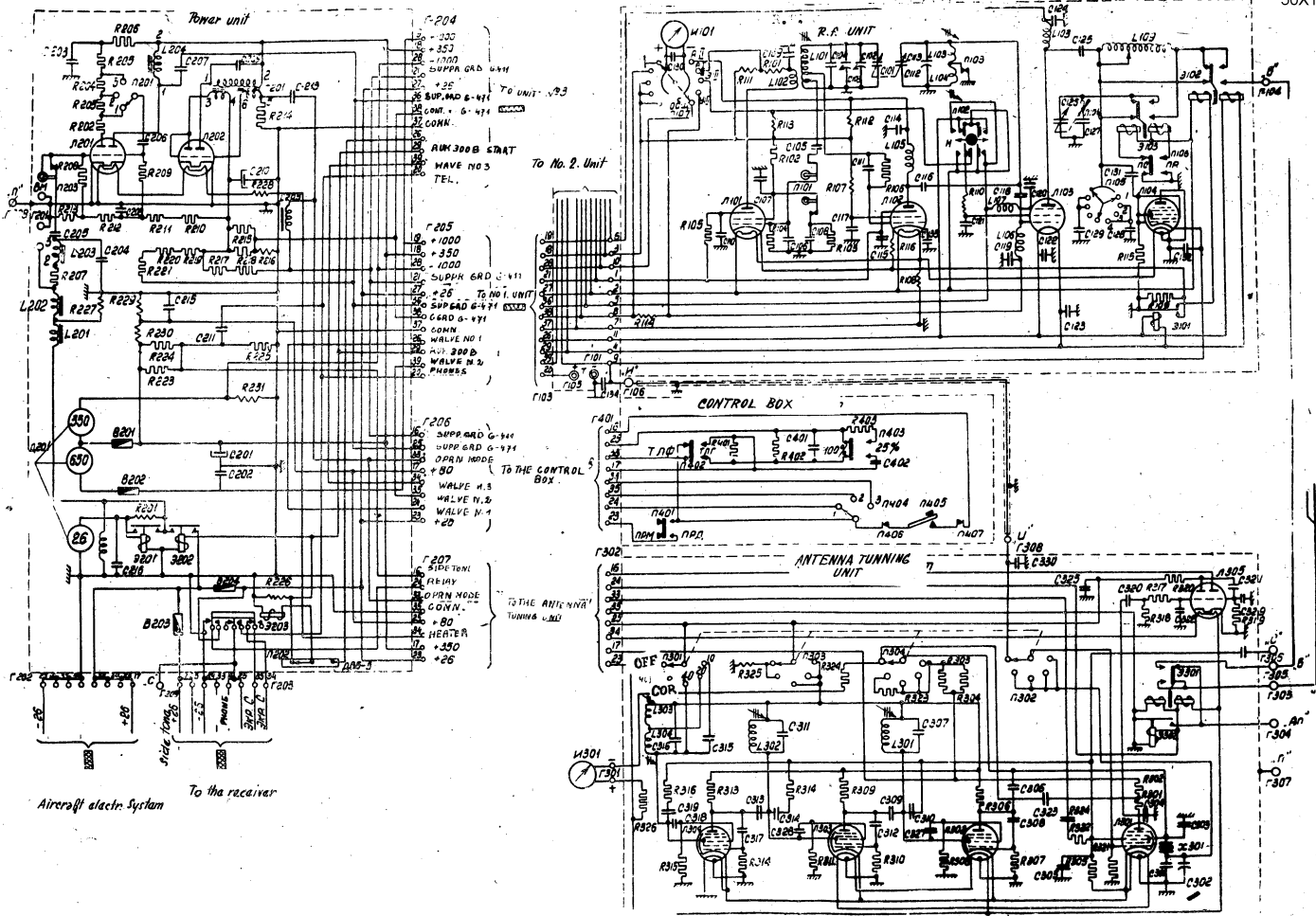
Supplement 10.

Mixer circuit wiring diagram.

2/Power unit, 3/R.f. unit, 4/Control box.

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Transmitter wiring diagram

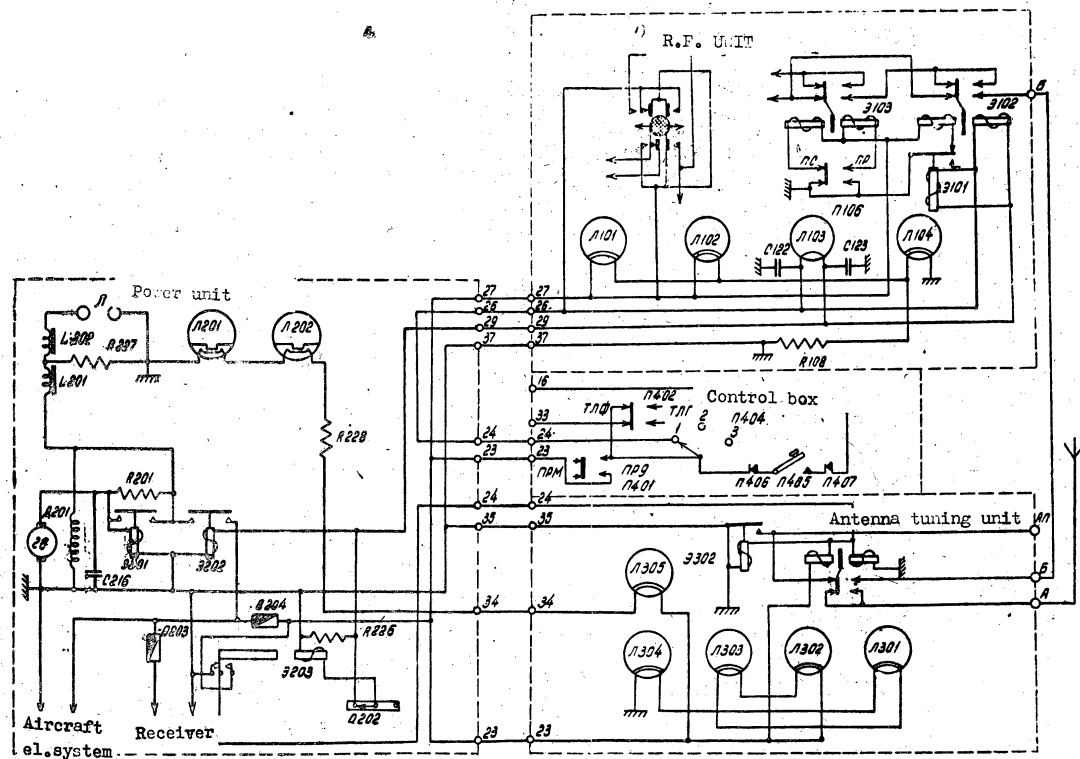
Supplement 1.
50X1

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50X1

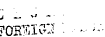
Low Tension circuit
Wiring diagram

Supplement 9

SECRET
NO FOREIGN DISSEM

Supplement 10

MIXER CIRCUIT
WIRING DIAGRAM



DISSEM

- 79 -

50X1

C o n t e n t s .

	Page
I. Organisation of repairs	1
II. Preliminary location of defects	2
§ 1. Inspection	3
§ 2. Location of defects of power unit	5
§ 3. Checking of overall performance of transmitter ..	8
III. Stage by stage location of defects of transmitter ..	13
§ 1. R.f. unit location of defects	13
§ 2. Location of defects of modulator	21
§ 3. Location of defects of antenna tuning unit ..	22
IV. Transmitter adjustment	31
§ 1. Relay adjustment	31
§ 2. Calibration adjustment of the r.f. units ..	33
§ 3. Alignment of the buffer stage and master oscillator frequency	36
§ 4. Adjustment of the transmitter crystal ca- librator	37
V. Checking of the transmitter after repair	42
§ 1. Vibration resistance check	43
§ 2. Inspection of the external appearance and of the assembly condition	43
§ 3. Checking of the transmitter operation and current drawn by the low tension circuits ..	43
§ 4. Checking of the power output dissipated in the artificial antenna	44
§ 5. Checking of calibration accuracy	46
§ 6. Checking of modulation depth	48
§ 7. Checking of the transmitter and crystal ca- librator best frequency signal amplitude ..	49
§ 8. Checking of side tone signal amplitude	52
§ 9. Checking of throat microphone supply voltage ..	53
§ 10. Checking of modulator gain	54
Supplements:	
1. Transmitter wiring diagram	78
2. Specification to the RSB-5 transmitter wiring diagram	55
3. Technical requirements for a repaired transmitter ..	69
4. Transmitter choke and relay winding parameters ..	71
5. Adapter for checking the 6SA7 vacuum tube operation	72
6. Tool for transmitter calibration adjustment	73
7. Equivalent load of the power unit	73
8. Set of spare parts supplied by the factory for transmitter overhaul	75
9. Low tension circuit wiring diagram	78
10. Mixer circuit wiring diagram	78